FOR OFFICIAL USE ONLY.

Vol. 11. No. 11. pp. 737-822. November, 1941

IMPERIAL MYCOLOGICAL INSTITUTE
6 NOV. 1941

# THE VETERINARY BULLETIN

1941

WEYBRIDGE:
IMPERIAL BUREAU OF ANIMAL HEALTH
WEYBRIDGE, SURREY
ENGLAND

Price 5/- net

Annual Subscription £2

# Imperial Agricultural Bureaux.

## EXECUTIVE COUNCIL.

| | |
|---|---|
| *Chairman* ... ... ... ... ... ... ... ... | Vacant. |
| SHAMALDHARI LALL, C.I.E., I.C.S., Deputy High Commissioner, *Vice-Chairman* ... ... ... ... ... ... | India and Burma. |
| Sir DONALD FERGUSSON, K.C.B. ... ... ... ... | United Kingdom. |
| F. L. McDOUGALL, C.M.G. ... ... ... ... ... | Australia. |
| F. J. DU TOIT ... ... ... ... ... ... ... ... | Union of S. Africa. |
| NEVILL L. WRIGHT, F.I.C., D.I.C. ... ... ... ... | New Zealand. |
| J. M. ADAMS, F.R.C.Sc. (I) ... ... ... ... ... | Eire. |
| D. JAMES DAVIES, C.B.E. ... ... ... ... ... ... | Newfoundland. |
| B. F. WRIGHT ... ... ... ... ... ... ... | Southern Rhodesia. |
| J. A. CALDER, C.M.G. ... ... ... ... ... ... | Colonies Protectorates and Mandated Territories. |
| Sir DAVID CHADWICK, K.C.M.G., C.S.I., C.I.E. ... ... | Secretary. |

## STAFF OF IMPERIAL BUREAU OF ANIMAL HEALTH, WEYBRIDGE.

*Director*:

Vacant.

*Deputy Director and Editor of The Veterinary Bulletin and of Index Veterinarius:*

W. A. POOL, M.R.C.V.S.

*Second Officer:*

J. TWEEDALE EDWARDS, M.R.C.V.S.

*Assistants:*

RUTH ALLCROFT, B.Sc., Ph.D.

G. EIRA JONES, B.A.

MOYA RIMINTON.

ENID M. SMEDLEY, M.Sc.

# CONTENTS

## LIST OF CHIEF SUBJECTS

[Many subjects dealt with are omitted from the list and will be found in the appropriate places. Particular subjects sometimes appear under different headings: *e.g.* Tuberculosis may appear under :– Diseases Caused by Bacteria and Fungi; Immunity; Diseases, General (papers on several diseases); Public Health; Therapeutics; Technique; Reports and Book Reviews].


| | PAGE |
|---|---|
| DISEASES CAUSED BY BACTERIA AND FUNGI [see also Immunity]... | 737–755 |
| Streptococcal infection ... ... | 737 |
| Tuberculosis ... ... ... ... | 740 |
| Glanders ... ... ... ... | 744 |
| Listerella infection ... ... ... | 745 |
| B. coli infection in calves ... ... | 746 |
| Salmonella infection ... ... | 747 |
| Brucellosis ... ... ... ... | 749 |
| Anaerobic infection ... ... ... | 754 |
| DISEASES CAUSED BY PROTOZOAN PARASITES ... ... ... | 755–760 |
| Trypanosomiasis ... ... ... | 755 |
| Coccidiosis ... ... ... ... | 757 |
| Leptospirosis ... ... ... | 759 |
| DISEASES CAUSED BY VIRUSES ... | 760–769 |
| Foot and mouth disease ... ... | 760 |
| Respiratory catarrh in horses ... | 762 |
| Swine fever ... ... ... ... | 763 |
| Rabies ... ... ... ... | 764 |
| Influenza ... ... ... ... | 765 |
| Dog distemper ... ... ... | 767 |
| Pox ... ... ... ... ... | 767 |
| PARASITES IN RELATION TO DISEASE [GENERAL] ... ... ... | 769–770 |
| PARASITES IN RELATION TO DISEASE [ARTHROPODS] ... ... | 770–772 |
| Ticks ... ... ... ... ... | 771 |
| PARASITES IN RELATION TO DISEASE [HELMINTHS] ... ... | 772–777 |
| Trematodes ... ... ... ... | 773 |
| Cestodes ... ... ... ... | 773 |
| Nematodes ... ... ... ... | 774 |
| IMMUNITY [including Allergic and Serological Diagnosis] ... | 777–782 |
| Brucellosis ... ... ... ... | 778 |
| DISEASES GENERAL [General diseases not dealt with under other headings: Organic diseases, Miscellaneous diseases and Neoplasms] ... ... | 782–791 |
| NUTRITION IN RELATION TO DISEASE [see also Diseases General and Physiology]... ... | 791–805 |
| Minerals ... ... ... ... | 792 |
| Vitamins ... ... ... ... | 794 |
| PUBLIC HEALTH ... ... ... | 795–797 |
| Milk hygiene ... ... ... | 795 |
| THERAPEUTICS ... ... ... | 797–801 |
| Bacterial diseases ... ... ... | 797 |
| Protozoan diseases ... ... ... | 799 |
| Helminthiasis ... ... ... | 801 |
| POISONS AND POISONING ... | 801–805 |
| PHYSIOLOGY ... ... ... | 805–809 |
| TECHNIQUE AND APPARATUS ... | 809–810 |
| MISCELLANEOUS ... ... ... | 811–813 |
| REPORTS ... ... ... ... | 813–820 |
| Great Britain ... ... ... | 813 |
| India ... ... ... ... ... | 813 |
| Canada ... ... ... ... | 815 |
| Australia ... ... ... ... | 816 |
| South Africa ... ... ... ... | 817 |
| Mauritius ... ... ... ... | 817 |
| Nigeria ... ... ... ... | 817 |
| Uganda ... ... ... ... | 819 |
| Zanzibar ... ... ... ... | 819 |
| Burma ... ... ... ... | 819 |
| BOOK REVIEWS ... ... ... | 820–822 |

# INDEX TO AUTHORS


Abel, A., 760.
Ackert, J. E., 769.
Akins, J. T., 815.
Alexander-Jackson, E., 743.
Allen, C. E., 810.
Allen, E. A., 757.
Andersen, T., 781.
Anderson, A. B. See Tompsett, S. L., jt. author, 802.
Angeloff, 812.
Antoniotti, D., & Romat, A., 768.
Argentina. Regul. Contr. Ticks, 772.
Asplin, F. D., 791.
August, H. M., 787.
Australia. Rep. Coun. sci. indust. Res., 1938-39, 816.

Bakker, S., 764.
Bandel, D. See Guthrie, J. E., et al., jt. authors, 801.
Bankowski, R. A. See Beach, J. R., jt. author, 746.
Barnum, C. P. See Mackay, E. M., et al., jt. authors, 806.
Bartram, M. T. See Welch, H., et al., jt. authors, 797.
Bateman, J. B., Chambers, L. A., & Calkins, H. E., 781.
Batt, F., 793.
Battle, J. See Bazeley, P. L., jt. author, 738.
Bazeley, P. L., & Battle, J., 738.
Beach, J. R., & Bankowski, R. A., 746.
Beard, J. W. See Bryan, W. R., jt. author, 769.
Beaudette, 784.
Beck, M. D. See Eaton, M. D., et al., jt. authors, 769.
Bell, W. B., 737.
Bellolio, P. See Lipschütz, A., et al., jt. authors, 809.
Bennetts, H. W., 792.
Bergier, P. L., 756.
Bessemans, A., Wittebolle, P., & de Borchgrave, O., 759.
Bethke, 784.
Bier, O. See Rocha e Silva, M., jt. author, 790.
Bierer, B. W., 821.
Biester, H. E., & Schwarte, L. H., 746.
Birge, E. A., 749.
Birkeland, J. M. See Steinhaus, E. A., jt. author, 755.
Bjerregaard, S., 741.
Blanck, E., 795.
de Borchgrave, O., 799, *bis*.
—. See also Bessemans, A., et al., jt. authors, 759.
Bos, A. See Nieschulz, O., jt. author, 756.
Bowstead, J. E., & Sackville, J. P., 792.
Boyd, W. C., & Hooker, S. B., 780.
Brandly, 784.
Brandly, C. A. See Graham, R., jt. author, 768.
Brit. med. J., 774.
Brock, J. E., 750.
Brown, H. E. See Derrick, E. H., et al., jt. authors, 758.
Bryan, W. R., & Beard, J. W., 769.
Bull. imp. Inst., 803.
Bullough, W. S. See Carrick, R., jt. author, 771.
Burbank, R. C. See Korenchevsky, V., et al., jt. authors, 808.
Burma. Rep. civ. vet. Dep., 1939-40, 819.
Burnett, E., 820.
Buxton, J. B., 813.

Calkins, H. E. See Bateman, J. B., et al., jt. authors, 781.
Cameron, A. E., 764.
Cameron, T. W. M., 770, *ter*.
Canada. Rep. prov. Vet., N.B., 1937-38, 815.
—. Rep. Sup. Poult. Div., N.B., 1937-38, 815.
Candioti, A. N., 769.
Canič, R., 778.
Cardenas, C. C. See Castaneda, M. R., jt. author, 753.
Carne, H. O. See Mackay, E. M., et al., jt. authors, 806.
Carpenter, 784.
Carrick, R., & Bullough, W. S., 771.
Carta, A., 757.
Casals, J. See Webster, L. T., jt. author, 764.
Castaneda, M. R., & Cardenas, C. C., 753.
Castelo, M. See Viera, O., jt. author, 758.
Chambers, L. A. See Bateman, J. B., et al., jt. authors, 781.
Chiapponi, F., 778.
Christiansen, M. J., & Jespersen, P. H., 741.
Cicala, G., 740.
Clifton, C. E., 754.
Coatney, G. R., 759.
Coghill, R. D. See Fell, N., et al., jt. authors, 781.
Cohen, J. See Korenchevsky, V., et al., jt. authors, 808.
Cole, C. G., & McBryde, C. N., 763, *bis*.
Collier, H. B., 798, 807.
Collier, W. A. See Mochtar, A., jt. author, 760.
Craig, J. F., & Davies, G. O., 740, 787.
Cummins, S. L., 743.

Dack, G. M., 754.
Dacorso Filho, P., 760.
Dalling, T. See Griffith, A. S., et al., jt. authors, 743.
Datta, S. C. A., 772.
Davies, G. O. See Craig, J. F., jt. author, 740, 787.
Derrick, E. H., & Smith, D. J. W., 758.
—, —, Brown, H. E., & Freeman, M., 758.
Dible, J. H., & Hay, J. D., 806.
Djaenoedin, R. See Kraneveld, F. C., jt. author, 755.
Doeve, W. C. A., 744.
Dolman, C. E., Hudson, V., & Mathias, D. G. B., 797.
Dols, M. J. L., Jansen, B. C. P., Sizoo, G. J., & van der Maas, G. J., 793.
Douglas, K. L., & Walker, R. V. L., 799.
Dubos, R. J., & Hotchkiss, R. D., 780.
Duncan, C. W. See Sykes, J. F., et al., jt. authors, 785.
Durant, A. J., & McDougle, H. C., 768.

Eaton, M. D., Beck, M. D., & Pearson, H. E., 769.
Eichhorn, A., & Thaller, H. I., 778.
Eickmann, H., 785.
Eisenberg-Merling, K. B., 767, *bis*.
Emerson, G. A., & Evans, H. M., 795.
—. See also Shimotori, N., et al., jt. authors, 795.
Emori, M. See Namikawa, S., et al., jt. authors, 737.
Evans, A. C., 739.
Evans, H. M. See Emerson, G. A., jt. author, 795.
—. See also Shimotori, N., et al., jt. authors, 795.

Fallis, A. M., 772.
—. See also Gwatkin, R., jt. author, 770.
Feldman, W. H., & Karlson, A. G., 742.
Fell, N., Stern, K. G., & Coghill, R. D., 781.
Ferguson, J., 795.
Fiebiger, W., & Tempel, D., 773.
Follensby, E. M., & Hooker, S. B., 780.
Folley, S. J., & Young, F. G., 807, *bis*.
Francis, W. D. See Gurney, E. H., jt. author, 804.
Fraser, T. N., & Rennie, J. B., 805.
Frazer, A. C., 806.
Freeman, M. See Derrick, E. H., et al., jt. authors, 758.
Fuller, A. T. See James, G. V., jt. author, 797.

Galtandzhiev, G., 765.
Galli-Valerio, B., 788.
Garrod, L. P., & Maclean, D., 774.
Gavrilov, W., 788.
Generoso, J. D., & San Agustin, F., 754.
Giovine, M., & Machado, A., 765.
Glover, J. S., 783.
Goerttler, V., 785.
—, & Pröger, K., 785.
Gordon, W. S. See Taylor, A. W., et al., jt. authors, 771.
Graham, R., & Brandly, C. A., 768.
Gray, P. H. H., 809.
Gt. Britain. Med. Man. chem. Warfare, 805.
—. Rep. Princ. roy. vet. Coll., 1940, 813.
—. Rep. Res. Comm. Contr. Sheep Tick, 771.
—. Rep. Res. Comm. Dis. Calves, 782.
Greathouse, G. A. See Rigler, H. E., jt. author, 810.
Greene, H. S. N., 789.
Greenwood, D. A., 802.
Griffith, A. S., Dalling, T., & Pagel, W., 743.
Griffiths, H. J., 773, 774.
Grini, O., 760.
Gunst, J. A., 755.
Gurney, E. H., & Francis, W. D., 804.
Guthrie, J. E., Powick, W. C., & Bandel, D., 801.
Gwatkin, R., 754.
—, & Fallis, A. M., 770.
—, & Moynihan, I. W., 794.

Habel, K., 764.
Hall, K. See Korenchevsky, V., et al., jt. authors, 808.
Hanson, J. H. See Murphy, J. M., jt. author, 739.
Harazawa, J. See Nonaka, N., et al., jt. authors, 742.
Harding, R. D., 755.
Harrison, J., 796.
Hart, L., 787, 804.
Hay, J. D. See Dible, J. H., jt. author, 806.
Henderson, W. W., 811, 817.
Hepding, L., 742.
Hewitt, E. A., 805.
Hillermark, K., 742.
Hindmarsh, W. L., 804.
Hinshaw, 784.
Hinshaw, W. R., & McNeil, E., 748.
Hoffman, H. A., 786.
Holman, H. H. See Taylor, A. W., et al., jt. authors, 771.
Hooker, S. B. See Boyd, W. C., jt. author, 780.
—. See also Follensby, E. M., jt. author, 780.
Horsfall, F. L., Jr., & Lennette, E. H., 767.
—, —, & Rickard, E. R., 767.
—. See also Lennette, E. H., jt. author, 766.
Horvat, J., 746.
Hoshika, F. See Nonaka, N., et al., jt. authors, 742.
Hotchkiss, R. D. See Dubos, R. J., jt. author, 780.
Hudson, V. See Dolman, C. E., et al., jt. authors, 797.
Huffman, C. F. See Sykes, J. F., et al., jt. authors, 785.
Humphreys, F. A., & Moore, T., 752.
Hupbauer, A., 763.
—, & Lugomer, V., 763.

India. Agric. & Anim. Husb., 1937-38 813.

Jackeman, H. W., 782.
Jackson, C. H. N., 770.
James, G. V., & Fuller, A. T., 797.
Janicki, M. J., 776.
Jansen, B. C. P. See Dols, M. J. L., et al., jt. authors, 793.
Jansen, J., 782.

Jastrzebski, D., 799.
Jedlicky, A. See Lipschütz, A., et al., jt. authors, 809.
Jerstad, A. C., 777.
Jespersen, P. H. See Christiansen, M. J., jt. author, 741.
de Jesus, Z., 772.
Jones, T. L., & Schofield, F. W., 739.
—. See also Schofield, F. W., jt. author, 792.
Jungherr, 784.
Jurado, P. R. See Riglos, A., jt. author, 748.
Jusatz, H. J., 746.

Karlson, A. G. See Feldman, W. H., jt. author, 742.
Karnicki, E. See Stryszak, A., jt. author, 778.
Kawahara, Y., 755.
Keeler, C. E. See Trimble, H. C., jt. author, 806.
Kenda, I., 761.
Kester, W. O., 797.
King, E. S., & Lucas, M., 743.
Kirkpatrick, A. C., 817.
Kitselman, C. H., 750.
Knaysi, C., 755.
Köbe, K., & Wahl, F., 761.
Kolesnik, N. See Linnik, F., jt. author, 753.
Kolodny, M. H., 756.
Korenchevsky, V., 808.
—, Hall, K., Burbank, R. C., & Cohen, J., 808.
—. See also Ross, M. A., jt. author, 808.
Kraneveld, F. C., & Djaenoedin, R., 755.
Kurihawa, Y. See Namikawa, S., et al., jt. authors, 737.

Langham, R. F. See Sholl, L. B., et al., jt. authors, 787.
Laporte, R., 777.
Lee, J. E. S., 774.
Lefebure, Y., 817.
Legg, J., & White, C. T., 804.
Lennette, E. H., & Horsfall, F. L., Jr., 766.
—. See also Horsfall, F. L., Jr., jt. author, 767.
—. See also Horsfall, F. L., Jr., et al., jt. authors, 767.
Levine, N. D., 758.
Levine, P. P., 800, *bis*.
Linnik, F., & Kolesnik, N., 753.
Lipschütz, A., Vargas, L., Jr., Jedlicky, A., & Bellolio, P., 809.
Locke, A., Main, E. R., & Mellon, R. R., 797.
Lothe, H., 752.
Lothes, R., 744.
Love, E. L., 752.
Lucas, G. H. W., 803.
Lucas, M. See King, E. S., jt. author, 743.
Lucker, J. T., 775.
Lugomer, V. See Hupbauer, A., jt. author, 763.
Lutz, A., 809.
Lyster, L. L., 775.

van der Maas, G. J. See Dols, M. J. L., et al., jt. authors, 793.
McBryde, C. N. See Cole, C. G., jt. author, 763, *bis*.
McCance, R. A. See Wilkinson, B. M., jt. author, 793.
McClure, F. See Thornton, H. R., et al., jt. authors, 795.
McClure, F. J., 802.
McDougle, H. C. See Durant, A. J., jt. author, 768.
Mace, D. L., 805.
McEwen, A. D., & Priestley, F. W., 753.
McGilvray, C. D., 752.
Machado, A. See Giovine, N., jt. author, 765.
McHenry, E. W., 791.
McIntosh, R. A., 791.
Mackay, E. M., Wick, A. N., Carne, H. O., & Barnum, C. P., 806.
Maclean, D. See Garrod, L. P., jt. author, 774.
McLeod, J. A., 773.
McNaught, J. B., & Zapata, E. M., 774.
McNeil, E. See Hinshaw, W. R., jt. author, 748.
Mader, C. K., 796.
Magnusson, H., 763, 791.
Mail, G. A., 771.
Main, E. R. See Locke, A., et al., jt. authors, 797.
Majorow, S. N., 807.
Mancuso, C., 744.
Marko, Z., 763.
Markowitsch, W. A., 762.
Marriott, W. H., 751.
Marsh, H., & Tunnicliff, E. A., 757.
Martin, 784.
Mastrofrancisco, N., & Raimo, H. F., 777.
Mathias, D. G. B. See Dolman, C. E., et al., jt. authors, 797.
Mauritius. Rep. vet. Div., 1939, 817.
Mejlbo, E., 747.
Mellon, R. R. See Locke, A., et al., jt. authors, 797.
Menkin, V., 790.
Menton, J., 796.
Miller, M. J., 775.
Mitchell, C. A., 792.
Mitscherlich, 762.
Mochtar, A., & Collier, W. A., 760.
Mohler, J. R., 811.
Moholdt, A., 793.
Momberg-Jørgensen, H. C., 748, 765, 767.
Mondolfo, U., 747.
Moore, T. See Humphreys, F. A., jt. author, 752.
Morelli, E., 790.
Morison, J. E., 738.
Mott, L. O. See Stein, C. D., et al., jt. authors, 800.
Moynihan, I. W. See Gwatkin, R., jt. author, 794.
Muench, H. See Reed, L. J., jt. author, 812.
Murphy, J. M., & Hanson, J. H., 789.
Myers, J. A., 820.

Nakamura, J., 761.
Namikawa, S., Kurihawa, Y., & Emori, M., 737.
Nelson, W. O., 809.
Nieschulz, O., & Bos, A., 756.
Nigeria. Rep. vet. Dep., 1939, 817.
Nonaka, N., Harazawa, J., & Hoshika, F., 742.
Nordlund, I., 746.
Norway. Rep. bov. Brucellosis, 1939, 749.

Ochi, Y., & Zaizen, K., 744.
van Oijen, C. F., 748.
Oklješa, B. See Rajčević, M., jt. author, 798.
Oliver-González, J., 775.
Osimani, J. J. See Talice, R. V., jt. author, 756.
Osteen, O. L. See Stein, C. D., et al., jt. authors, 800.
Ostrolenk, M. See Welch, H., et al., jt. authors, 797.
Ouyang, G. See Wong, S. C., jt. author, 777.

Pagel, W. See Griffith, A. S., et al., jt. authors, 743.
Pagnini, U., 779.
Pankratov, A., 753.
Parnell, I. W., 776.
Paterson, J. S., 745, *bis*.
Pearson, H. E. See Eaton, M. D., et al., jt. authors, 769.
Peatt, E. S. W., 798.
Pedersen, K. O. See Svedberg, T., jt. author, 810.
Penfold, W. J., Tolhurst, J. C., & Wilson, D., 754.
Pfeffer, A. See Seelemann, M., jt. author, 784.
Pires, A., 776.
Piwowarczyk, S., 760.
Plastridge, W. N. See Rettger, L. F., jt. author, 750.
Plum, N., 740.
Powick, W. C. See Guthrie, J. E., et al., jt. authors, 801.
Pratt, I., 757.
Priestley, F. W., 753.
—. See also McEwen, A. D., jt. author, 753.
Pröger, K. See Goerttler, V., jt. author, 785.
Prouty, C. C., 739.
Pullar, E. M., 801.
Purchase, H. S., 810.

Quevedo, J. M., 796.

Raimo, H. F. See Mastrofrancisco, N., jt. author, 777.
Rajčević, M., & Oklješa, B., 798.
Reed, L. J., & Muench, H., 812.
Reggianini, O., 791.
Rennie, J. B. See Fraser, T. N., jt. author, 805.
Rettger, L. F., & Plastridge, W. N., 750.
Reynes, V., 743.
Richards, P. W., Tansley, A. G., & Watt, A. S., 770.
Richardson, E. H., Jr., 781.
Rickard, E. R. See Horsfall, F. L., Jr., et al., jt. authors, 767.
Rigler, N. E., & Greathouse, G. A., 810.
Riglos, A., & Jurado, P. R., 748.
Rippon, S. R., 819.
Roberts, F. H. S., 801.
Rocha e Silva, M., & Bier, O., 790.
Roe, A. F., 810.
van Roekel, H., 748.
Romat, A. See Antoniotti, D., jt. author, 768.
Rosenbusch, C. T., 766.
Ross, M. A., & Korenchevsky, V., 808.
Rudin, K. E., 749.

Sabin, A. B., 762.
Sackville, J. P. See Bowstead, J. E., jt. author, 792.
San Agustin, F. See Generoso, J. D., jt. author, 754.
Sandin, R. B. See Thornton, H. R., et al., jt. authors, 795.
Sato, A. See Tuji, Y., jt. author, 737.
Schilling, C., 755.
Schnücke, R., 798.
Schoch, W., 793.
Schofield, F. W., & Jones, T. L., 792.
—. See also Jones, T. L., jt. author, 739.
Schoop, 783.
Schoop, G., & Stolz, A., 798.
Schwarte, L. H. See Biester, H. E., jt. author, 746.
Seelemann, M., & Pfeffer, A., 784.
Senekji, H. A., 773.
Sergeant, Et., 804.
Shelswell, J., & Williams, R. T., 797.
Shillinger, J. E., & Wetmore, P. W., 759.
Shimotori, N., Emerson, G. A., & Evans, H. M., 795.
Sholl, L. B., Langham, R. F., & Thorp, W. T. S., 787.
Simmons, R., 819.
Simon, J., 779.
Sizoo, G. J. See Dols, M. J. L., et al., jt. authors, 793.
Smith, D. J. W., 758.
—. See also Derrick, E. H., jt. author, 758.
—. See also Derrick, E. H., et al., jt. authors, 758.
Smith, M. C., & Spector, H., 794, *ter*.
Smith, M. J., & Soderholm, L. C., 785.
Soderholm, L. C. See Smith, M. J. jt., author, 785.
Sørensen, C. F., 741.
Spann, J., 800.

Spector, H. See Smith, M. C., jt. author, 794, *ter*.
Spink, W. W., 799.
Srivastava, H. D., 777.
Stafseth, 784.
Stein, C. D., Osteen, O. L., & Mott, L. O., 800.
Steinhaus, E. A., & Birkeland, J. M., 755.
Stern, K. G. See Fell, N., et al., jt. authors, 781.
Stevenson, W. G., 799.
Stewart, D. F., 799.
Stewart, W. L., 771.
Stitz, B., 781.
Stolz, A. See Schoop, G., jt. author, 798.
Stryszak, A., & Karnicki, E., 778.
Stubbs, C. D., 750.
Stubbs, E. L., 790.
Sulkin, S. E. See Willett, J. C., jt. author, 764.
Svedberg, T., & Pedersen, K. O., 810.
Swann, H. G., 807.
Sykes, J. F., Duncan, C. W., & Huffman, C. F., 785.

Talice, R. V., & Osimani, J. J., 756.
Tansley, A. G. See Richards, P. W., et al., jt. authors, 770.
Taylor, A. W., Holman, H. H., & Gordon, W. S., 771.
Taylor, R. M., 766.
Tempel, D. See Fiebiger, W., jt. author, 773.
Thaller, H. I., 778.
—. See also Eichhorn, A., jt. author, 778.
Thomas, B. F. See Thomas, S. B., jt. author, 796.
Thomas, S. B., & Thomas, B. F., 796.
Thornton, H. R., McClure, F., & Sandin, R. B., 795.
Thorp, W. T. S. See Sholl, L. B., et al., jt. authors, 787.
Tolhurst, J. C. See Penfold, W. J., et al., jt. authors, 754.
Tompsett, S. L., & Anderson, A. B., 802.
Trimble, H. C., & Keeler, C. E., 806.
Trudel, F., 752.
Tuji, Y., & Sato, A., 737.
Tunis. Rep. Pasteur Inst., 1938, 820.
Tunnicliff, E. A. See Marsh, H., jt. author, 757.

Uganda. Rep. vet. Dep., 1940, 819.
Union of South Africa. Rep. Dir. Abattoir & Live Stk Mkt, Johannesburg, 1939-40, 817.
U.S.A. Anim. Dis. Sta., B.A.I. (Beltsville), 811.
—. Medicofilm Serv., Army med. Libr., 811.
—. Rep. Comm. Bang's Dis. [Amer. Vet. Med. Ass.], 750.
—. Rep. Comm. Bang's Dis. [U.S. Live Stk Sanit. Ass.], 1938, 750.
—. Rep. Comm. misc. transm. Dis. [U.S. Live Stk Sanit. Ass.], 1940, 782.
—. Rep. Comm. parasit. Dis. [U.S. Live Stk Sanit. Ass.], 1939 & 1940, 769.
—. Rep. Comm. Poult. Dis. [Amer. Vet. Med. Ass.], 784.
—. Rep. Comm. Tick Erad. [U.S. Live Stk. Sanit. Ass.], 1939, 772.
—. Rep. Comm. transm. Dis. Poult. [U.S. Live Stk Sanit. Ass.], 1938, 783; 1940, 784.
—. Rep. Comm. transm. Dis. Swine [U.S. Live Stk Sanit. Ass.], 1939, 782.

Vargas, L., Jr. See Lipschütz, A., et al., jt. authors, 809.
Vellisto, E., 779.
Viera, O., & Castelo, M., 758.
Villares, J. B., 806.

Wahl, F. See Köbe, K., jt. author, 761.
Waldmann, O., 761.
Walker, J., 749.
Walker, R. V. L. See Douglas, K. L., jt. author, 799.
Watt, A. S. See Richards, P. W., et al., jt. authors, 770.
Weaver, C. H., 783.
Webster, L. T., 780.
—, & Casals, J., 764.
Welch, H., Ostrolenk, M., & Bartram, M. T., 797.
Wetmore, P. W. See Shillinger, J. E., jt. author, 759.
White, C. T. See Legg, J., jt. author, 804.
Whitlock, J. H., 775.
Wick, A. N. See Mackay, E. M., et al., jt. authors, 806.
Wickware, A. B., 776, 802.
Wight, A. E., 750.
Wilkinson, B. M., & McCance, R. A., 793.
Willett, J. C., & Sulkin, S. E., 764.
Williams, R. D., 803.
Williams, R. T. See Shelswell, J., jt. author, 797.
Wilson, D. See Penfold, W. J., et al., jt. authors, 754.
Winther, O., 767.
Wittebolle, P. See Bessemans, A., et al., jt. authors, 759.
Wolfson, F., 759.
Wong, S. C., & Ouyang, G., 777.
Wood, F. L., 815.
Wood, S. N., 792.
Wright, W. H., 774.

Young, F. G. See Folley, S. J., jt. author, 807, *bis*.

Zaizen, K. See Ochi, Y., jt. author, 744.
Zanzibar. Rep. Dep. Agric., 1940, 819.
Zapata, E. M. See McNaught, J. B., jt. author, 774.
Zimmerman, H. R., 773.

NOTE:—In certain cases it is not possible to check references in the original publication. Such references are marked with an asterisk.

Bulletins on disease subjects written for farmers and "popular" articles of a similar nature are not included in the *Veterinary Bulletin*. Those of a sufficiently important nature, are, however, included in *Index Veterinarius*; so also are certain review articles, presidential addresses, congress proceedings, etc., where the title conveys as much information as could be given in an abstract of a few lines. For information of this nature, readers of the *Veterinary Bulletin* are referred to *Index Veterinarius*, where titles of all publications indexed by the bureau are fully cross-referenced.

**INDEX VETERINARIUS.**

*See notice on page 3 of cover.*

IMPERIAL BUREAU OF ANIMAL HEALTH

THE

# VETERINARY BULLETIN

Vol. 11.] November, 1941. [No. 11.

## DISEASES CAUSED BY BACTERIA AND FUNGI

BELL, W. B. (1940). **Studies on Staphylococci of Animal Origin.**—*Cornell Vet.* **30.** 514–525.

Sixty-one strains of staphylococci isolated from horses, cattle, sheep, goats, pigs, dogs, cats, and g. pigs were studied for toxin formation, pigment production, haemolysin production, coagulase production, and fermentation of mannitol. Of these strains, 54 were of the *Staph. aureus* type, the remainder *Staph. albus*. Only one of the latter was haemolytic. About half the *Staph. aureus* strains yielded α toxin and some of them β toxin as well. None formed β toxin alone. Coagulation of human and equine plasma correlated perfectly with the presence of α toxin, but in the mannitol fermentation tests, not only toxin forming strains but many non-toxin producers fermented mannitol.—GWILYM O. DAVIES.

I. NAMIKAWA, S., KURIHAWA, Y., & EMORI, M. (1940). **On the Specificity of *Streptococcus equi* from View-Point of Fortner's Anaerobic Cultivation.**—*Jap. J. vet. Sci.* **2.** 518–530. [In Japanese: abst. from English summary].

II. TUJI, Y., & SATO, A. (1940). **On the Type Differentiation of Hemolytic Streptococci Isolated from Strangles, Pneumonia and other Streptococcal Diseases of Equines. 1. The Type Differentiation by the Biological Examination.**—*Ibid.* 593–616. [In Japanese: abst. from English summary].

I. It was observed that when *Str. equi* was cultivated according to Fortner's anaerobic technique, all or part of the colonies presented a "Medusa head" formation, usually at the 18th hour but becoming less distinct at the 24th hour. The bacteria growing in this form were non-encapsulated. Thirty-four out of 36 strains of G type *Str. equi*, and 43 out of 44 strains of C type *Str. equi* produced this type of colony. No F type *Str. equi* did so, nor did equine strains of *Str. pyogenes* types A and B, nor several human strains of haemolytic streptococci from various sources, including all those classified by Griffith. The authors detail typical variation in behaviour of several strains of *Str. equi*, type G, and show that there was no fixation of colonial type by subcultivation through 40 passages anaerobically, an immediate return to ordinary S colonies being obtained as soon as a change to aerobic culture was made. A more luxuriant growth of *Str. equi* and other haemolytic streptococci was obtained by Fortner's method than by aerobic culture, and haemolysin production was increased. The R type colony probably forms because of excess of carbon dioxide as it also develops when grown by NOBATA'S method [*V. B.* **10.** 718.] in which $CO_2$ is supplied to the medium. This method of cultivation may expedite the diagnosis of a proportion of strangles cases, etc., in horses.

II. The authors isolated 100 strains of streptococci from 83 cases of equine disease and from the nasal discharge of six normal horses. These strains were submitted to the following tests:– fermentation of mannitol, sorbitol, glucose, maltose, trehalose, saccharose, lactose, raffinose, inulin, and salicin; splitting of aesculin; hydrolysis of starch; final pH in glucose broth; capsule formation (all non-encapsulated strains gave a clear supernatant

with deposit in serum broth while encapsulated strains produced turbidity); haemolysis; reduction of methylene blue; colony type when superimposed on a fluorescent culture of *Pasteurella suiseptica*; Fortner's anaerobic culture [see I], and tolerance to bile, methylene blue, and heat. From the results of these tests it is concluded that 28 strains belonged to group I haemolytic streptococci (*Str. equi*), especially two non-encapsulated strains which conformed to the C variant type; 67 strains were classed as group II (*Str. pyogenes*, type A) and 10 strains were classed as group III (*Str. pyogenes*, type B). The two *Str. equi*, C type strains were isolated from a case of coryza and from a complication of strangles and infectious anaemia. In the latter case, the C type was isolated from the spleen while the typical G type *Str. equi* was isolated from the lung. [The source of the various other strains examined is not stated in the summary.]—C. V. WATKINS.

BAZELEY, P. L., & BATTLE, J. (1940). **Studies with Equine Streptococci. I. A Survey of Beta-Haemolytic Streptococci in Equine Infections.**—*Aust. vet. J.* **16.** 140–146.

Material was examined from 415 cases of infectious diseases in horses, and from these 457 strains of haemolytic streptococci were isolated. Without exception one or more types of haemolytic streptococci were recovered where fresh material in the nature of pus or swabs was examined.

These strains were all shown to belong to Group C Lancefield by appropriate precipitin tests. They have been divided into five types on fermentation tests and colony type as shown in the table.

The colony of *Str. equi* is honey coloured and dome shaped and grows to about 3 mm. in diameter in 24 hours. Tenacious strands are formed when a platinum loop is withdrawn after touching a colony. The E1 type of colony is about half the size of the *Str. equi* colony and frequently has a "fried egg" shape. The colonies are almost clear when viewed by transmitted light and often oily to touch with a loop. E2 colonies are about the same size, but have an opaque white centre and are hard and friable in consistency.

The validity of this classification was confirmed by agglutination tests.

Type 1 was isolated in pure culture from 40 freshly opened, primary strangles abscesses. The same applied to five metastatic strangles abscesses, but abscesses that had been opened several days sometimes contained types 2 and 4 in addition.

In respiratory catarrh there were 179 pure infections with type 2, 58 with type 1, 18 with type 4, 4 with type 3, and 1 with type 5.

The original should be consulted by those interested in this subject.

| *Type* | *Organism* | *Sugar Fermentations* | | | *Colony Type* |
|---|---|---|---|---|---|
| | | Trehalose | Sorbite | Lactose | |
| 1. | *Streptococcus equi* | — | — | — | *Streptococcus equi* |
| 2. | *Streptococcus pyogenes*, var. *equi* | — | + | + | Equine 1 (E1) |
| 3. | | — | + | — | |
| 4. | | + | — | — | Equine 2 (E2) |
| 5. | | + | — | + | |

—W. I. B. BEVERIDGE.

MORISON, J. E. (1940). **Capsulation of Haemolytic Streptococci in Relation to Colony Formation.**—*J. Path. Bact.* **51.** 401–412. [Author's summary copied *verbatim*].

In a study of the part played by the capsule in determining the form of colonies of streptococci of Lancefield's group A which had not been subjected to artificial conditions to induce variation, the amount of capsular material and

its persistence were found to vary with the medium and with the strain.

Capsulation, intimately associated with the period of most active growth, is best demonstrated in young cultures in serum broth. Even on moist agar the production of capsules or their persistence may be limited and the expression of the true phase of the strain masked. The importance of the capsule and of its size and duration in determining colony form is illustrated and the internal structure of the young colony investigated by a method of cultivation on cellophane.

It is suggested that all the strains were capsulated and, being potentially mucoid, should be described as in that phase. The degree to which this character is developed *in vitro* is no sufficient guide to virulence.

EVANS, A. C. (1940). **Studies on Hemolytic Streptococci. VI. The Epidemicus Group.** — *J. Bact.* **40.** 215–222. [Author's summary copied *verbatim*]. [For previous parts see *V.B.* **10.** 231].

Eighteen of Griffith's 30 type strains belong to Lancefield's group A and ferment lactose and salicin but not mannitol. Twelve are sensitive to phage C/594 filtrate; two are resistant to the filtrate but are sensitive to the nascent phage; four are resistant to the nascent phage.

Among 212 strains of Lancefield's group A which ferment lactose and salicin but not mannitol, the majority of strains resistant to phage C/594 (63·9 per cent) fell in Griffith's serologic types 13, 22, 25, 27 and 30. Only a few (7·2 per cent) strains sensitive to C/594 filtrate fell in those five serologic types.

Among 35 strains with the given characters from epidemics of septic sore throat, the majority (60 per cent) were resistant to nascent C/594 phage. Only 5 (14·3 per cent) were sensitive to the filtrate.

PROUTY, C. C. (1940). **Observations on the Growth Responses of *Streptococcus lactis* in Mastitis Milk.**—*J. Dairy Sci.* **23.** 899–904. [Author's summary copied *verbatim*].

The growth responses of *S. lactis*, as judged by changes in the pH values and microscopic examinations have been studied in separate samples of milk drawn from the infected and non-infected udder-quarters of cows suffering with mastitis.

Milk with an initial pH value greater than 6·9 usually failed to support the growth of *S. lactis* in an active manner, whereas normal milk from the other udder-quarters showed normal acid development. The growth responses of *S. lactis* varied somewhat in the milk drawn from the three cows under study.

Adjusting the pH value of mastitis milk to that of normal milk resulted in only partially overcoming delayed acid development. Mastitis milk treated in this manner changed little in pH value until after fifteen to twenty hours, after which time acid development was quite rapid.

The addition of as little as 10 per cent of very abnormal mastitis milk to normal milk had a retarding effect on *S. lactis* development.

Pasteurizing some samples of mastitis milk at 65·5°C.–68·5°C. for 30 minutes tended to partially overcome the retarding influence on the growth of *S. lactis*; however, with most of the samples studied heat treatment at these temperatures had little or no appreciable effect.

MURPHY, J. M., & HANSON, J. H. (1941). **A Modified Whiteside Test for the Detection of Chronic Bovine Mastitis.**—*Cornell Vet.* **31.** 47–55.

This paper gives the results of an investigation into the efficiency of a test described by WHITESIDE (1939). As modified by the authors it is performed by mixing 5 drops of fore-milk with 1 drop of N·NaOH on a glass plate placed on a dark background, stirring with a glass rod for 20 sec., and examining by reflected light for the presence of a precipitate.

The results of the test were compared with those of bacteriological examination and other indirect tests, and it was found that they agreed very closely with the leucocyte count as a presumptive test for this disease.

—GWILYM O. DAVIES.

JONES, T. L., & SCHOFIELD, F. W. (1939). **Bovine Mastitis. Studies on a Simplified Method of Diagnosis.**—*Canad. J. comp. Med.* **3.** 54–57.

A modification of the Hotis test, the dye being added after five hours' incubation (to prevent inhibition of growth). After 48 hours, samples showing no colour change are regarded as negative, provided the animal has no history of mastitis and the sample is normal in appearance and by the bromthymol blue test. Milk showing colour changes is examined microscopically and plated on Edwards' medium.

The sediment of samples showing evidence of mastitis, but not yielding *Streptococcus agalactiae*, should be cultivated on blood agar.

—R. GWATKIN.

CICALA, G. (1940). Contributo alla differenziazione colturale del Bacillus antracis dai germi carbonchiosimili. **[Differentiation between *B. anthracis* and Similar Micro-Organisms].**—*G. Batt. Immun.* **24.** 31–48. [English, French and German summaries]. [English summary amended].

Anthrax bacilli may be recognized by their behaviour on modified Petragnani's medium prepared by using thionine instead of malachite green, or by reducing the concentration of malachite green 50%. The cultures should be grown on solid media and examined 24, 48, and 72 hours after transference to Petragnani's medium.

PLUM, N. (1939). Undersøgelser over Tuberkulose og Tuberkulinreaktioner hos Kvaeg. (2. Meddelelse). **[Research on TB. and Tuberculin Tests. II].**—*Maanedsskr. Dyrlaeg.* **51.** 81–96, and 128–140. [For part I, see *V. B.* **10.** 159].

*Statistical observations on tuberculin and TB.* An analysis is given of the records of 2,079 cows which reacted to the intradermal tuberculin test with a skin thickness increase of 3·5 mm. or over on the third day after injection. They were all slaughtered and records of the P.M. findings were collected according to a standard plan of co-operation by many Danish veterinary practitioners and meat inspectors.

Of the 2,079 cows, 68 (3·3%) showed no tuberculous lesions P.M.

The data are analysed according to size of herd, geographical origin, breed, localization of tuberculous lesions, number of TB. centres per animal, age of the animal, intensity of reaction, and type of lesion. Results are given in tables and are commented upon in the text, which should be consulted by interested workers. The average reaction of the tuberculous animals was 9 mm., younger beasts reacting more severely than older ones. Jersey cattle reacted more strongly than other breeds, and there was no relation between the number of TB. centres and the intensity of the reaction.

*A case of avian type TB. of the uterus in a cow.* This is an illustrated case record. The wall of the uterus was found by rectal examination to contain many nodules and the cow reacted to avian but not to bovine tuberculin. The wall of the uterus was seen P.M. to contain purulent abscesses the size of hazel nuts, which on culture were found to contain avian type tubercle bacilli.

*Notes on a conference at the Veterinary Directorate, Jan. 19th, 1939.* Some current research work is referred to. (1) Natural transmission of avian TB. to other animals. Rats and one sparrow were proved to be infected. (2) Initial tests with synthetic medium tuberculin and P.P.D. were not promising. (3) Tuberculin tests on army and brewery horses resulted in many reactions to avian tuberculin and a few to bovine tuberculin, yet the percentage of TB. in slaughter horses was only 0·25. (4) Transmission of TB. from human beings to cattle. One case involving the human type bacillus is referred to and 12 cases involving the bovine type.—J. E.

CRAIG, J. F., & DAVIES, G. O. (1941). **Tuberculosis of the Brain and Meninges in Bovines.**—*Vet. J.* **97.** 61–64.

The authors accept the theory that tuberculous meningitis is usually secondary to tubercles which form in the brain substance from which tubercle bacilli escape along the perivascular spaces and thence involve the meninges. They state that there are cases in which the pia mater may be almost wholly involved without tubercles being detectable by thin sectioning in the tissues of the brain and cord. They illustrate, with two cases, the variability in the rapidity and type of symptoms shown according to which tissues are involved.

In the first, hyperaesthesia was prominent and slight tremors and spastic contractions of the head and neck muscles were noted. The heifer leaned against the walls with its left side and head when left alone. It reacted to tuberculin and was killed. The pia mater of the brain and first portion of the cervical cord was extensively studded with tiny grey tubercles. A firm yellow lesion was present in the right thalamus (probably the primary brain lesion but secondary to other lesions in the body) and most likely caused the nervous symptoms. Tubercle bacilli were numerous in the brain lesions.

In the second case death occurred within seven hours of the appearance of symptoms of "madness". TB. lesions were present in the thorax and brain. A tuberculoma of $2 \times 1\frac{1}{2}$ in.

involved the left cerebral hemisphere, causing a compression displacement of the opposite hemisphere. Few tubercle bacilli were found in the lesion. This case probably flared up rapidly; extensive necrosis and caseation of the brain lesion, without any apparent fibrosis limitation, supports this opinion. The histology of the lesions is detailed and illustrated.

—C. V. WATKINS.

I. CHRISTIANSEN, M. J., & JESPERSEN, P. H. (1938). Om tuberkuløs Parringssmitte fremkaldt af en Foreningstyr. [**Cases of Bovine TB. Transmitted by Copulation**].—*Maanedsskr. Dyrlaeg.* **49.** 621–630.

II. BJERREGAARD, S. (1939). Om Genitaltuberkulose. [**Genital TB. in Cows**].—*Ibid.* **51.** 201–210.

I. Tuberculin tests on a hitherto TB.-free herd of 18 cows resulted in four reactions, all four reactors having been served by a bull provided by a breeding society. The bull was examined and had small tuberculous lesions on the penis and prepuce. Two of the four reactors had small lesions on the vulva and vestibulum; they were proved to be tuberculous.

The breeding activities of the bull were followed up, and it was found that it had served 25 heifers or cows in six clean herds: all these animals reacted on test and seven of them had tuberculous lesions on the external genitalia.

The bull had also served 34 cows in infected herds. Two of these cows showed lesions of vulvar TB. on examination. That more did not show such lesions is taken as evidence that the cows had previously been infected and were resistant to reinfection.

In the 25 animals referred to above the interval between service and the detection of vulvar TB. varied from 2–9 months; in the 34 cows the first of the two cases was noticed three months after service.

The bull was slaughtered and was found to be affected with generalized TB., including lesions in the seminal vesicles but not in the testes.

The authors conclude that all cattle with genital TB. ought to be reported and slaughtered, that heifers with open TB., including TB. of the vagina, uterus or peritoneum ought not to be bred, but should be slaughtered, that tuberculous bulls should not be used for breeding, and that bulls of breeding societies should not be allowed to serve cows in clean as well as in infected herds without appropriate restrictions.

II. By a law passed in Denmark in 1928 the slaughter of cows found by microscopic methods to be affected with uterine TB. was made compulsory. The law has, however, been ineffective in reducing the number of cases of TB., on account of the great difficulty in detecting affected cows. Uterine TB. may be of the closed or open types and there may or may not be a vaginal discharge, which in many cases is regarded as indicating merely a non-tuberculous infection, such as is a common sequel to parturition. The birth of a calf with congenital TB. is of course immediate evidence of uterine TB. in the cow, although this fact is not compulsorily made use of in tracing and eliminating infected cows [see following abst.].

In practice, B. has noticed that a sudden increase in the number of reactors in a herd is an indication that the herd contains a cow with open uterine TB., this being the type of lesion which is most dangerous in that a massive infection can be spread on a farm.

Also, in meat inspection practice B. has found that the receipt at an abattoir of animals with TB. may be an important sign that a cow with uterine TB. exists on the farm of origin, especially when the history of the herd is well known.

It is known that there may be a discharge from an infected pregnant uterus some time before the birth or abortion of the congenitally infected calf, which, though often small and weak, may appear normal and healthy. It is important not to add a newborn calf to the clean section of a herd before it has been washed and disinfected.

For the clinical diagnosis of genital TB. it is important to palpate *per rectum* the inguinal and iliac lymph nodes as well as the uterus and peritoneum.

B. finally describes an instance of transmission of genital TB. among heifers by a bull, which was severely affected with generalized TB. including the seminal vesicles and penis mucosa, but not the testes, the outbreak being traced from meat inspection findings on a heifer with TB. of vulva and vagina.—J. E.

SØRENSEN, C. F. (1939). Om Anmeldepligt ved medfødt Kalve-tuberkulose. [**Notifiability of Congenital TB. in Calves**].—

*Maanedsskr. Dyrlaeg.* **51.** 238–241.

S. quotes official abattoir returns to show that congenital TB. in calves in Denmark increased between 1928 and 1937, a total of 8,926 cases being seen in these ten years. Yet the total number of cows showing TB. of the uterus at slaughter during the same period was only 5,066. It can therefore be assumed that some 4,000 cows with uterine TB. escaped detection and consequent slaughter under the regulations for the control of the disease.

S. therefore urges the importance of making congenital TB. in calves notifiable, so that in each case the dam can be traced and slaughtered.
—J. E.

HILLERMARK, K. (1940). **Några fall av fågeltuberkulos hos nötkreatur. [Some Cases of Avian TB. in Cattle].**—*Svensk Vet-Tidskr.* **45.** 1–17.

After a review on the nature of avian type TB. in cattle and on the cultural and animal inoculation methods of diagnosing it, H. describes four cases in which it was considered to be present in bovines, *viz*, a two-month-old calf and its dam, a nine-year-old cow, a cow either 2½ or ten years old (samples confused), and a three-year-old cow. In no case was the diagnosis clearly positive and in no case were any tuberculous poultry in contact with the cattle, so the true nature of the cases remained rather obscure.—J. E.

FELDMAN, W. H., & KARLSON, A. G. (1940). **The Pathogenicity for Cattle of the Avian Tubercle Bacillus.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 114–132.

A review is given of the findings of various workers concerning the sensitivity of cattle to heterologous tuberculins, the infectivity of avian tubercle bacilli for cattle, and the lesions occurring in cattle naturally infected with avian tubercle bacilli. Conclusions made from the available information were :– that although the avian tubercle bacillus has at least a limited pathogenicity for cattle, it may exist as a parasite in their tissues without causing recognizable tissue change ; that lesions produced incline to remain localized and, although usually less severe than those caused by the bovine type tubercle bacillus, are without features which might be regarded as specific of avian type tuberculous infection ; and that the interpretation of the tuberculin test in cattle is made more difficult by the existence of TB. in poultry on the same farm, since natural exposure of cattle to avian tubercle bacilli may render them sensitive to mammalian as well as to avian tuberculin.—R. O. MUIR.

HEPDING, L. (1939). **Beiträge zur Tuberkulose der Tauben. [TB. in Pigeons].**—*Arch. wiss. prakt. Tierheilk.* **74.** 442–458.

The work described here began with the receipt of the heads of three pigeons, all from one flock, which were affected with TB. of the conjunctiva and eyelid. Cultural tests resulted in the isolation of an avian strain of tubercle bacillus, which regularly in culture started growth in fine, dry, yellowish streaks like the bovine type bacillus, but in subculture grew quickly as an eugonic, moist, slimy colony. By animal inoculation (fowl, rabbit, g. pig) it was judged to be an avian strain with relatively high virulence for the g. pig.

Ten pigeons were artificially infected in various ways and the very varied results are described with special reference to primary complex and generalization.

Some experimental tuberculin tests on infected pigeons failed to give clear results.
—J. E.

NONAKA, N., HARAZAWA, J., & HOSHIKA, F. (1941). **Experimental Studies Concerning the Recovery of Pathogenicity of B.C.G. by Passage through White Rats.**—*Kitasato Arch. exp. Med.* **18.** No. 1. 30–38. [In English]. [Authors' conclusions amended].

1. BCG recovered its pathogenicity for white rats after passage through these animals. Recovery of virulence was apparent by the fourth passage, and after the sixth passage maximum pathological changes were noted in animals inoculated ; the number of organisms seen in various viscera increased as the pathological changes became more severe. The most marked pathological changes were found in the lungs, liver, and spleen. In the first two organs especially, numerous organisms were found. Although the pathological changes were very marked the number of organisms seen was comparatively small. The kidney showed only a few tubercles and organisms.

2. BCG, which had recovered its virulence by repeated passage through white rats, temporarily produced very marked tuberculous

changes in rabbits, but there was no indication of increase in organisms. After a time the organisms disappeared. Thus there was no permanent increase of virulence for rabbits.

3. BCG which, after repeated passage through white rats, recovered its virulence for these animals showed no increased virulence for g. pigs.

CUMMINS, S. L. (1940). **Adsorption of the Early Products of Bovine Tubercle Bacilli in Rabbits by Anthracite Dust.**—*Brit. med. J.* Nov. 9th. 623–624. [Author's conclusions copied *verbatim*].

The addition of a small quantity of anthracite dust to quanta of living bovine tubercle bacilli has led, in five animals, to their survival for considerably longer periods than the five control rabbits receiving bovine bacilli alone, and, in one, to complete recovery up to six months.

This appears to be due to the adsorption by anthracite dust of a proportion of the toxic products of living tubercle bacilli in the tissues.

KING, E. S., & LUCAS, M. (1940). **A Study in Culturing Tubercle Bacilli from Sputum.**—*J. infect. Dis.* **67.** 213–216. [Authors' summary copied *verbatim*].

This study was undertaken to determine from examination of several mediums which one resulted in the greatest number of positive cultures of tubercle bacilli when made from microscopically positive sputum specimens. A group of 15 mediums were used and 50 specimens of positive sputum were examined.

Of these specimens 82% were positive for growth on our bean-egg medium containing 1·5% glycerine and 1 : 10,000 gentian violet after 21 days' incubation at 37C. On the basis of the number of specimens cultured it proved definitely superior to any other medium. Both cultural methods and guinea pig inoculations should be employed on all specimens wherever possible since neither one alone seems to be 100% reliable.

ALEXANDER-JACKSON, E. (1941). **Isolation of Tubercle Bacilli. A Comparison of Various Media for Primary Isolation of the Tubercle Bacillus from Pathological Material.**—*Amer. Rev. Tuberc.* **43.** 441–447. [Author's summary copied *verbatim*].

A cultural study of 45 pathological specimens for the isolation of tubercle bacilli was made in which 4 egg media (Petragnani's, Löwenstein's, Holmes' modification of Löwenstein's and Corper's) and the original and modified Bordet-Gengou media were employed. Growth of tubercle bacilli was obtained from 23 of the specimens. Five of these cultures were isolated on the Bordet-Gengou media, but failed to develop on any of the egg media, and one culture grew on the egg media but not on either one of the Bordet-Gengou media.

From these results it appears that while almost all of these media are valuable in the primary isolation of tubercle bacilli from pathological specimens, no single medium is sufficient to ensure isolation from material that contains very few microörganisms. Therefore, when such specimens are to be cultured for the presence of tubercle bacilli, at least two media should be employed, one egg medium, such as Petragnani's or Löwenstein's, and the Bordet-Gengou medium in its original formula or modified by the addition of ferric chloride. If only one medium is used, Petragnani's or Löwenstein's medium with malachite-green dye would be preferable, since they are more resistant to contaminants than the Bordet-Gengou medium.

REYNES, V. (1939). Effets des auto-surinfections et des hétéro-surinfections tuberculeuses chez le cobaye. [**Effects of Auto- and Hetero-Superinfection in Tubereulous G. Pigs**].—*Ann. Inst. Pasteur.* **62.** 177–193.

One bovine strain and two human strains of the tubercle bacillus were used to inoculate g. pigs subcutaneously either in the hip or in the plantar pad in doses of 0·001–0·01 mg. The inguinal or popliteal lymph node was removed from each g. pig 11–86 days after the primary injection, and 0·3 c.c. of the suspension, made by grinding up the lymph node in 2–4 c.c. of saline, was injected into the same g. pig (auto-superinfection), into a g. pig of the same series (hetero-superinfection) and into a control g. pig. The reaction to auto-superinfection proved to be the same as that to hetero-superinfection. Superinfection made within three weeks of primary injection resulted in a fresh focus of infection, but if made at a later stage it had no effect, except in cases where the resistance produced by primary infection was broken down by a very large dose of bacilli.—R. O. MUIR.

GRIFFITH, A. S., DALLING, T., & PAGEL, W.

(1940). **Inoculation and Immunity Experiments on Calves with the Vole Strain of Acid-Fast Bacillus.**—*J. Hyg., Camb.* **40.** 673–680.

The vole strains of an acid-fast bacillus [see WELLS.—*V. B.* **9.** 520.], which have already proved to be incapable of producing progressive TB. in g. pigs, were tested for their immunizing value. It was found that serial doses induced a slight protection but did no more than delay death from TB.

In three calves, the intravenous injection of from 0·01 mg. up to 10 mg. of a vole strain produced lesions in various organs which histologically were tuberculous in nature. The changes were slight and tended to disappear without leaving any trace. A dose of 80 mg. given intramuscularly produced a large local lesion, but there was no evidence of generalization at the 89th day.

A series of calves was then injected in order to determine whether a resistance to virulent infection was produced. Four calves were vaccinated once, three by intravenous and one by subcutaneous inoculation, the intervals between the vaccinations and the resistance tests being 65, 65, 166, and 175 days. Five calves were vaccinated twice, two receiving two intravenous injections, one an intravenous and a subcutaneous injection and two receiving two subcutaneous injections. The resistance to TB. of the nine treated and two untreated calves was tested by the oral administration of culture of virulent bovine tubercle bacilli, the dose in each case being 7·5 mg. of culture given by pipette [see also BUXTON, GLOVER, BOSWORTH & DALLING.—*V. B.* **10.** 736].

The calves, together with two controls, were killed at intervals ranging from 209–223 days. Both controls showed widespread lesions of TB. with involvement of the thoracic cavity. Five vaccinated calves showed trivial lesions in lymph nodes of the alimentary tract, while the remaining four were completely free from visible signs of the disease. Virulent bovine tubercle bacilli were recovered, however, from glands which were apparently uninfected.

It is suggested that the immunizing power of vole strains for calves is superior to BCG and that a single inoculation is as effective as two doses. The intravenous route is preferred to the subcutaneous method which produces unsightly local lesions.—R. E. GLOVER.

OCHI, Y., & ZAIZEN, K. (1940). **Studies on the Genus *Corynebacterium*.**—*Jap. J. vet. Sci.* **2.** 155–183. [In Japanese: abst. from English summary].

The authors studied several strains of *C. diphtheriae*, "*C. pseudodiphtherium*", *C. renale*, *C. equi*, *C. murium*, "*C. acne contagiosae*", *C. pyogenes*, and "*C. pseudopyogenes*", and they suggest classification of them into six species, *viz*, *C. diphtheriae*, *C. pseudodiphtherium* (Types I and II), *C. xerose*, *C. acnes*, *C. pyogenes*, and *C. pseudopyogenes* (Types I and II). Slight differential characters, according to the source of the strains, were observed in *C. renale*, *C. equi*, and *C. murium*, but the authors class them all as *C. pseudodiphtherium*. The chief properties of the six species are described.

[The classification is far from complete for the genus (*C. bovis* and *C. ovis* are not mentioned) and the characters usually ascribed to *C. murium* do not fit in well with those now described for "*C. pseudodiphtherium*".]

—C. V. WATKINS.

MANCUSO, C. (1940). Azione del bacillo del mal rossino in cavie splenectomizzate. [**Susceptibility of Splenectomized G. Pigs to *Erysipelothrix rhusiopathiae* (the Bacillus of Swine Erysipelas)**].—*Profilassi.* **13.** 62–65. [French and German summaries]. [Abst. from French summary].

Splenectomized g. pigs proved refractory to experimental infection with *E. rhusiopathiae*.

LOTHES, R. (1939). Zur Tilgung des Rotzes in der Rheinprovinz. [**Eradication of Glanders in the Rhine Province**].—*Berl. Münch. tierärztl. Wschr.* Nov. 10th. 665–671.

An account of L.'s experiences when dealing with glanders in the early years of the present century.

DOEVE, W. C. A. (1938). De wettelijke bestrijding van malleus. [**The Control of Glanders by Legal Measures**].—*Ned.-ind. Bl. Diergeneesk.* **50.** 374–379.

D. proposes some sanitary measures for the control of glanders, the chief being the slaughter of clinical cases, and of doubtful cases in areas free from the disease. In areas where glanders reappears periodically, the mallein test (ophthalmic) should be applied to animals with doubtful symptoms; the positive reactors should be slaughtered and doubtful reactors kept under observation until recovery or the appearance of characteristic symptoms, further mallein tests and the complement-fixation test

being applied. Positive reactors to the c.-f. test should be slaughtered and the doubtful reactors retested every month until clear results are obtained.

A weakly positive reactor to the c.-f. test may be " doubtful " and may not show lesions of " active glanders " at autopsy, but the positive and strongly positive reactors always show lesions. Animals which recover spontaneously from the disease are hypersensitive. It is stated that positive mallein reactors without clinical symptoms and which have been six times negative to the c.-f. test are immune. Compensation should be paid for all slaughtered animals in areas free from the disease.—L. TOBBACK.

I. PATERSON, J. S. (1940). **The Antigenic Structure of Organisms of the Genus** *Listerella*.—*J. Path. Bact.* **51.** 427–436.

II. PATERSON, J. S. (1940). **Experimental Infection of the Chick Embryo with Organisms of the Genus** *Listerella*.—*Ibid.* 437–440.

I. Recent experimental work has suggested that members of the genus *Listerella* do not form a homogeneous group. Studying the somatic and flagellar antigens of 54 strains of *L. monocytogenes* isolated from man and animals, P. has divided them into four types. These types appear to bear no relation to their geographical or host origin, except that it was found that type 3 consisted entirely of ten human strains isolated from cases of mononucleosis occurring in Denmark. Types 1 and 4 formed the two largest divisions and in them were found all the animal strains, while the last type was represented by a single strain, Gibson. The antigenic structure of the genus is given in the table.

II. Listerellosis is readily produced in experimental animals, but only by injecting large doses of the organisms and it is uncertain whether meningitis can be produced with regularity in mice and rabbits by human strains. The effect of nine S and three R strains on the developing chick embryo has been studied. A suspension of organisms of opacity equal to Brown Tube 2 was diluted ten million times and 0·1 ml. of this dilution was used to inoculate the egg by the intra-allantoic route. Fourteen-day-old chick embryos were used, and death resulted within 72 hours after the dose had been given. The earliest lesions occurred on the chorio-allantoic membrane and resembled those seen in virus infections. Although at this stage bacteria could be recovered from the body organs, histological evidence of their presence appeared later and the lesions closely simulated those seen in natural listerellosis. Infection of the nervous system appeared to be blood borne. The three R variants failed to infect and the non-virulent strain (Pirie), although killing the embryo, only produced lesions in the egg membranes.

| *Type* | *Flagellar antigens* | *Somatic antigens* | *No. of strains* | *Host species* | *Example* | *Country of origin* |
|---|---|---|---|---|---|---|
| 1 | AB | I II (III) | 20 | Rodent | 58 xxiii | England |
| | | | | Poultry | LS/2 | England |
| | | | | Man | Schultz | U.S.A. |
| 2 | BD | I II (III) | 1 | Man | Gibson | Scotland |
| 3 | AB | II IV (III) | 10 | Man | N/46 | Denmark |
| 4 | ABC | V (III) | 23 | Ruminants | J & L | U.S.A. |
| | | | | Poultry | G 101 | New Zealand |
| | | | | Fox | LS/13 | England |
| | | | | Man | Ten Broeck | U.S.A. |
| | | | | | B9227 | U.S.A. |
| | | | | | Cotoni | France |
| | | | | | Burn (?) | U.S.A. |
| | | | | | Montevideo | Uruguay |

—K. C. SELLERS.

BIESTER, H. E., & SCHWARTE, L. H. (1941). **Listerellosis in Swine and Criteria for Diagnosis.**—*Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* pp. 42–46. Discussion p. 47.

Listerellosis in swine is characterized by incoordination, inability to stand, trembling, nervousness, exaggerated limb movements, and hyperpnoea. Pigs of all ages are susceptible. Diagnosis cannot be made on clinical evidence alone. Autopsy reveals only slight congestion of the brain, and microscopic examination shows meningitis with monocytic infiltration and perivascular cuffing. Routine laboratory diagnosis comprises intracerebral inoculation of rabbits or g. pigs with brain tissue ground in saline or glycerin. In positive cases the experimental animals succumb in about 24 hours. Subinoculations of brain tissue on liver-infusion agar produce numerous *Listerella* colonies. The organism can also be isolated directly from affected swine by culture of brain tissue.—D. D. OGILVIE.

BEACH, J. R., & BANKOWSKI, R. A. (1940). **A Report of a Field Laboratory Trial of Vaccinating Chickens for Infectious Coryza with Avian Mixed Bacterin.**—*J. Amer. vet. med. Ass.* **97.** 320–322.

The authors report the result of a field and laboratory trial with a commercial mixed bacterin. The bacterin is a chemically killed whole-broth culture containing 25% *Haemophilus gallinarum*, 25% *Pasteurella aviseptica*, 10% streptococci, 10% *Staphylococcus albus*, 10% *Staph. aureus*, 10% *Bacterium coli*, and 10% *Corynebacterium pyogenes*.

Neither in the field nor in the laboratory test was any evidence obtained that the bacterin was of value either as a preventive or as a curative agent.—G. C. BRANDER.

JUSATZ, H. J. (1939). Das Vordringen der Tularämie nach Mitteleuropa in der Gegenwart. **[The Penetration of Tularaemia into Central Europe at the Present Time].**—*Z. Hyg. InfektKr.* **122.** 352–376.

During the last 15 years there have been epidemics of tularaemia in man in various parts of east, north, south-east and central Europe. The disease has not so far been recorded in western Europe, and it seems that the occurrence of epidemics in man is confined to certain areas where the climate favours animals which are suitable as reservoir hosts. These hosts are water rats in east Europe, lemmings in north Europe, and wild rabbits and hares in central and south Europe. The most widespread epidemics of recent years have been in the steppes of Russia, in the areas drained by the rivers Volga, Ural, and Ob. The type of country appears to influence the development of the disease and a low rainfall (less than 40 inches yearly) is found in all areas in Europe in which it has been recorded. These various factors are illustrated by a map and a comprehensive table which gives details of the outbreaks.

During 1936–7 there was an epidemic involving about 600 persons in German-occupied Poland and the main object of this paper seems to be a consideration of the possibility of further spread of the disease through the German Reich. J. considers this unlikely in view of the special factors of climate and fauna which are necessary for outbreaks to occur and be transmitted from affected wild rodents to man.—E. G. WHITE.

HORVAT, J. (1940). Kako pretvara bact. avisepticum diferencijalna gojilišta. **[Differential Cultural Characters of *Pasteurella aviseptica*].**—*Vet. Arhiv.* **10.** 277–282. [Abst. from German summary].

Five strains of *Past. aviseptica* were tested for action on carbohydrates. Acid was produced in laevulose, galactose, glucose, mannose, saccharose, arabinose, and mannite and traces of acid in xylose. No acid was formed in maltose, lactose, raffinose, soluble starch, sorbite, erythrite, dulcite, inulin, dextrin, glycerin, or amygdalin. No gas was formed in any of these substances. Indole was formed in peptone broth, milk was not coagulated, and litmus milk remained neutral.

To identify *Past. aviseptica* it is suggested that media containing laevulose, galactose, glucose, mannose, saccharose, mannite, and arabinose be used. Peptone broth is also useful.

NORDLUND, I. (1939). Utbredningen av smittsamma kalvsjukdomar jämte försök till typbestämming av hos kalvar funna kolibakterier. **[The Incidence of Infectious Diseases of Calves. Type Determination of *Bacterium coli* Strains Isolated from Calves].**—*Svensk Vet-Tidskr.* **44.** 313–331.

The results of ten years' diagnostic work on

calf diseases, based on P.M. investigations of 2,423 calf carcasses sent to the State Veterinary Bacteriological Institute from 1929–38 are given and analysed under the headings of causal organisms incriminated, incidence each year, incidence in each month of the year, and county of origin.

*Bact. coli* and "isocolon" bacteria were incriminated in one-half of all the cases, diplococci in one-fifth, and various other organisms in the rest. Most deaths occurred during the first five months of the year and in the counties near Stockholm. No great change in the local incidence of each type of infection took place during the ten-year period.

As it has been found that serum therapy with a stock polyvalent *B. coli* serum has often failed to save calves, a study of the *coli* strains concerned in calf losses was undertaken. An attempt to identify types by biochemical tests resulted in the setting up of six groups (A-F) on the basis of fermentative action on saccharose, raffinose, amylose, dextrin, adonite, dulcite, salicin, and arbutin, motility being considered at the same time.

A serological method was also used whereby the strains were grouped according to O-agglutination reactions with rabbit immune sera. In this way there were set up groups Ia, Ib, Ic, II, and III. Strains of group A corresponded closely to groups Ia and Ib, group E to group III, and group C to group II (with one exception). The other lettered groups did not fit into the numbered groups scheme.

A few H-aggln. tests with *coli* strains from calves and O-aggln. tests with cow sera against the calf *coli* strains were also carried out.—J. E.

MEJLBO, E. (1939). Isocolibacillosen hos Spaedekalve og dens Forebyggelse. [**"Isocolibacillosis" in Unweaned Calves**]. — *Maanedsskr. Dyrlaeg.* **50.** 497–510 and 523–533.

This is a detailed description of "isocolibacillosis" in newborn calves in Denmark. Between 1922 and April 1938, 11% of 8,122 dead calves sent to the State Serum Laboratory were diagnosed as having died of this form of acute enteritis. The disease is seasonal, occurring during the calving season of early spring, with a very steady incidence from year to year.

M. considers that calves contract the infection in the first few days of life before they have acquired their normal bacterial flora. When they have done this, at about the fourth day, they are resistant to infection with "isocolibacillosis".

In an attempt to control the disease, M. dosed newborn calves with cultures of *Lactobacillus acidophilus* and lactose, which are calculated to prevent colonization of the intestine by the harmful "isocoli bacilli". Experimental results on hundreds of calves in practice did not, however, indicate any appreciable success from this method, the mortality from "isocolibacillosis" remaining at about 10%.—J. E.

MONDOLFO, U. (1936). Sulla presenza di germi appartenenti al gruppo dei B. paratifici negli animali domestici. [**The Frequency of Paratyphoid Bacilli in Domestic Animals**].—*Rif. med.* **52.** 961–963. [Abst. in *Bull. Hyg., Lond.* **11.** 938, copied *verbatim*. Signed: G. S. WILSON].

Serological and cultural examinations were carried out in an endeavour to determine the frequency of paratyphoid infections of domestic animals whose flesh was intended for human consumption. Blood or milk serum was tested against 13 members of the Salmonella group, while cultures were made from the blood, milk, viscera, or faeces in Müller's and in Wilson and Blair's broth. The results may be summarized as follows—

*Cattle.*—Of 100 samples of blood serum examined serologically 3 agglutinated *Bact. typhi-murium* (Breslau bacillus) to 1/100–1/250, 1 *Bact. cholerae-suis* var. *kunzendorf* to 1/250, 2 *Bact. thompson* var. *berlin* to 1/250–1/500, and 3 *Bact. enteritidis* to 1/100–1/250. Of 200 samples of milk serum examined serologically, 2 agglutinated *Bact. typhi-murium* to 1/20–1/40 and 1 *Bact. cholerae-suis* var. *kunzendorf* to 1/40. Cultural examinations of 100 samples of blood, 200 samples of milk, and 10 samples of viscera all proved negative, but from 100 samples of faeces *Bact. typhi-murium* was isolated twice and *Bact. enteritidis* once.

*Sheep.*—Of 25 samples of blood, 2 agglutinated *Bact. abortus-ovis* to 1/100–1/250. Cultural examinations of 25 samples of blood, 5 of viscera, and 10 of faeces were all negative.

*Pigs.*—Of 100 samples of blood, 3 agglutinated *Bact. typhi-murium* to 1/100–1/250, 2 *Bact. cholerae-suis* var. *kunzendorf* to 1/250–1/500, and 2 *Bact. glässer-voldagsen* to 1/500. Cultural examination of 100 samples of blood and 10 of

viscera proved negative, but from 25 samples of faeces *Bact. glässer-voldagsen* was isolated once.

*Horses.*—Of 25 samples of blood, 1 agglutinated *Bact. enteritidis* to 1/100, and 2 *Bact. abortus-equi* to 1/250. Cultural examination of 25 samples of blood and 2 of viscera proved negative, but from 100 samples of faeces *Bact. enteritidis* was isolated once.

*Fowls.*—From 100 samples of faeces *Bact. typhi-murium* was isolated 4 times.

[The interpretation of the serological results is difficult, particularly since no mention appears to be made of the type of agglutination observed. In view of LOVELL'S work, no attention was paid to low titres, and the relatively high titres recorded must be regarded as to some extent suggestive of active infection].

RIGLOS, A., & JURADO, P. R. (1940). El aborto infeccioso de los equinos y la Salmonella Abortus Equi. [**Equine Infectious Abortion**].—*Rev. Med. vet., B. Aires.* **22.** 53–75.

This is a general review of present knowledge of the subject.—MILLER WATSON.

MOMBERG-JØRGENSEN, H. C. (1939). Infektiøs Kastning hos Hoppen. [**Infectious Abortion in Mares**].—*Maanedsskr. Dyrlaeg.* **50.** 537–554. [German summary].

This is the first authentic record of infectious abortion in mares in Denmark. It occurred in a large stud in the 1937 and 1938 breeding seasons and the causal organism, *Salmonella abortus-equi*, was identified at the State Serum Laboratory. It is described in detail, along with one peculiarity, which consists of the fact that the new Danish strain failed to ferment melibiose on the first day and did not attack it until after 3–7 days' interval.—J. E.

VAN ROEKEL, H. (1939). **Progress in Pullorum Disease Control and Eradication.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 162–170.

In a detailed report R. traces the encouraging results obtained in the eradication of *Salmonella pullorum* infection since the introduction of the macroscopic agglutination test for the detection of reactors. It is essential that the poultry keeper should co-operate fully, killing all reactors immediately and carrying out a systematic disinfection of all equipment on the removal of reactors. A list is given of 13 measures to be carried out in association with the aggln. test. Frequent testing associated with strict hygienic measures will result in the eradication of reactors in one season.

A series of five tables is included; these demonstrate effectively the value of frequent testing as a method of eradicating *S. pullorum* from a flock.—G. C. BRANDER.

HINSHAW, W. R., & MCNEIL, E. (1941). **Eradication of Pullorum Disease from Turkey Flocks.**—*Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* pp. 178–194.

An account is given of the eradication of pullorum disease from a group of turkey flocks in San Diego. The method used was based on the pullorum disease control and eradication programme of the National Poultry Improvement Plan. The project included monthly testing of all flocks by the tube agglutination method until one negative test had been obtained, field supervision of flocks, inspection of hatcheries, and propaganda. During the 1939–40 season, testing of 28,810 birds showed that only 30% of the birds and 50% of the flocks were free at the onset. During 1940–41, however, 81% of the birds and 81% of the flocks were free on first test. All infected flocks have since been sold or cleared by re-test, and since then 600,000 eggs have been hatched free from disease. All flocks now have the equivalent status of the United States "pullorum passed" grade.—D. D. OGILVIE.

VAN OIJEN, C. F. (1940). Salmonella-infectie in eendeneieren. [**Salmonella Infection in Duck Eggs**].—*Tijdschr. Diergeneesk.* **67.** 280–300.

In order to study the control of human paratyphoid infection arising from duck eggs, the author examined 10,000 ducks and 8,200 eggs, at the Egg Control Office at Beckberger in Holland.

He discusses the value of the general precautions taken (marking the eggs, boiling for 10 min., the prosecution of offending egg dealers), the measures connected with veterinary legal regulations to keep duck breeding under scientific supervision (autopsies, search for infected birds, bacteriological investigations on ducks and eggs), and pasteurization of shelled eggs which permits marketing with a guarantee that they do not contain live salmonella. Agglutination tests have been carried out on some ducks over three generations. Any

bird giving one positive test or laying an infected egg is eliminated. By means of these measures, from 1936–39 the percentage of positive reactors fell from 23·2 to 9·2, that of infected eggs from 14·3 to nil, and that of ducks giving infected eggs from 30 to nil. Indian runner ducks gave fewer infected eggs than other breeds.

It is possible technically and economically to market frozen and sterilized eggs, a valuable product free from paratyphoid bacilli and fit for exportation.—L. Tobback.

Birge, E. A. (1939). **Similarity of Chronic Infections with Salmonella Typhimurium and Tuberculosis in Guinea Pigs.**—*Amer. J. publ. Hlth.* **29.** 1125–1132.

A detailed account is given of an outbreak of and of work done on "pseudotuberculosis", caused by *S. typhi-murium*, that occurred in g. pigs used for the diagnosis of TB. Attempts to infect g. pigs by the mouth with the organism failed except when very large doses were given. The disease was transmitted to normal g. pigs by cohabitation. The presence of agglutinin in serum from infected g. pigs was inconstant, and B. considers that failure to demonstrate agglutinins does not mean that an animal is not, and has not been, affected with *S. typhi-murium*. The organism was isolated from animals apparently in good health. It was repeatedly isolated from the urine and/or the faeces and it was assumed that the disease was spread by contaminated faeces and urine; control measures based upon this assumption stopped the spread of the disease.—L. E. H.

Walker, J. (1940). **A Method for the Isolation of Toxic and Immunising Fractions from Bacteria of the Salmonella Group.** *Biochem. J.* **34.** 325–329.

Extracts with 2·5 *M* urea were made of cultures of *S. typhi-murium* and *S. typhi* grown on synthetic media and nutrient agar. These extracts contained substances consisting of a considerable amount of carbohydrate but of only minute amounts of protein (as shown by the characteristic colour tests and precipitation reactions). In biological tests it was found that these substances were highly toxic and conferred active immunity on mice. This method of urea extraction is the fourth by which non-protein chemical fractions with toxic and immunizing potencies can be isolated from organisms of the salmonella group [see also *V. B.* **11.** 585].—Alfred Eden.

—. (1940). Foreløbig melding fra Veterinaerdirektøren om resultatet av bekjempelsen av smittsom kasting pr. 31. desember 1939. **[Report of Bovine Brucellosis Control in Norway, 31st December, 1939].**—*Norsk VetTidsskr.* **52.** 115–120.

Tables and graphs show the progress, up to the end of 1939, of the control work on bovine brucellosis in Norway, in the different counties as well as in the country as a whole. The new eradication scheme had then been in operation for five years.

During that time, 3,076 herds had been detected and notified as infected. At the end of the same period the control work had progressed so far that 3,006 (97·7% of the above number) harboured no positive reactors, and in 2,975 herds (96·7%) the infection was regarded as eradicated.

There remained 101 herds (3·3%) not released from official supervision. Of these, 31 (1%) contained no positive reactors when the last test was performed, and in 55 herds (1·8%) the eradication work was so far advanced that in all probability they would be declared free from infection in a comparatively short time. When the last test was carried out, 70 herds (2·3%) proved to contain positive reactors.

For a report of the previous period, see *V. B.* **11.** 429.—J. E.

Rudin, K. E. (1940). Kort meddelande angående resultatet av frivilligt bekämpande av smittsam kastning hos ko inom ett tjurföreningsområde i överensstämmelse med lagen av den 17 juni 1938 (SFS 402/38). **[Report on Voluntary Control of Bovine Brucellosis in a Cattle Breeding Society District (Sweden)].**—*Svensk VetTidskr.* **45.** 18–24.

An account of the rapid and successful initiation of the State voluntary control scheme in a district containing 68 herds with 300 cows. The support of the local animal breeding society and dairy association, to which every farmer evidently belonged, seems to have been necessary or at least extremely helpful in obtaining the needful co-operation by the farmers, as the benefit of State financial support was not obtainable until after the completion of the blood testing at every farm.

Infection was found present at only three farms and was possibly present at one other farm, so the stamping-out method was used,

whereby the few reactors were killed and compensation paid for them. Subsequent tests showed that the disease had been eradicated. —J. E.

KITSELMAN, C. H. (1941). **Some Fundamental Factors Involving the Control of Bang's Disease.**—*Lederle vet. Bull.* **10.** 37–42.

A description of agglutination tests for *Brucella abortus*, avenues of infection etc., and remarks on calfhood vaccination which is favoured when the herd infection is greater than 15%.—S. J. GILBERT.

—. (1939). **[Report of Committee on] Bang's Disease [American Veterinary Medical Association].**—*J. Amer. vet. med. Ass.* **95.** 606–611.

The progress made in control activities during the previous year is reviewed. In communities where infection is rife the area plan of control is advisable although not always essential. Area work has been adopted in 22 states, and out of nearly four million cattle tested 3·2% were found to be reactors. In a large number of re-tests a reduction to 0·7% is shown. A uniform antigen for testing is now supplied by the Federal Bureau of Animal Industry. The committee repeats its previous recommendation that the final responsibility for diagnosis should be placed on the field veterinarian. The subject of vaccination is fully discussed and the vaccination of mature cattle is considered inadvisable. Calfhood vaccination is still in the experimental stage and should, therefore, not be recommended for general use, the results of the field trials not yet being available. As there is no definite knowledge that the status of low virulence of the strain used will remain unaltered under all the changes of environment to which the organisms are subjected when grown in different laboratories and injected into living bovine tissue, the committee considers that widespread use of the method should be discouraged. Also if calfhood vaccination is adopted it should be restricted to badly infected herds, and it is considered that the use of a living vaccine would produce results that would interfere with the operation of the area plan. With reference to undulant fever it is urged that livestock sanitary regulations should be revised and made uniform. The need for further research in brucellosis of cattle and other animals is stressed.—S. J. GILBERT.

I. WIGHT, A. E. (1939). **Accomplishments in the Federal-State Bang's Disease Project.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 16–22.

II. RETTGER, L. F., & PLASTRIDGE, W. N. (1939). **Some Pertinent Remarks on Bang's Abortion Disease Diagnosis and Control.**—*Ibid.* pp. 22–29. Discussion pp. 29–31.

III. BROCK, J. E. (1939). **The Range Cattleman's View of Bang's Disease Control.**—*Ibid.* pp. 39–47. Discussion pp. 47–52.

IV. STUBBS, C. D. (1939). **Area Work on Bang's Disease in Arkansas.**—*Ibid.* pp. 52–54. Discussion pp. 54–57.

V. —. (1939). **Report of the Committee on Bang's Disease.**—*Ibid.* pp. 57–59.

I. Substantial progress was made; 1,150,000 herds involving almost ten million cattle were under supervision [see also *V. B.* **8.** 628.], representing about 18% of all breeding cattle over six months of age. Reactors amounted to little more than 4% of the total cattle tested (including re-tests). The extent of infection in original tests varied from 5–40%. The control programme continued on a voluntary basis as far as the Federal Government was concerned, though in several states work was conducted systematically in given areas. Some of the testing was conducted in the field in some states while in others the blood samples were forwarded to central laboratories. Portable laboratories proved very satisfactory, being used in four states.

Vaccination experiments were continued and results indicated that vaccination should be limited to calves of 4–8 months of age. It was too early to evaluate results, but in a field project involving the inoculation of some 7,300 calves the percentage of abortions in vaccinated heifers had been very low. Testing of two commercial "cures" had demonstrated that these had no value and the facts were made public.

II. The authors urge the adoption of a more rigid programme of eradication. They deprecate the use of "short-cut" methods of testing and recommend the standard tube agglutination test carried out in the laboratory by properly trained persons. The doubtful reactor gave trouble but, as a rule, the reaction intensified or became negative within 10–14 days. A large number of doubtful reactors in a herd might

indicate some fault in technique, but the significance of such reactors depended chiefly on the status of infection in the herd. In herds in which there was increasing infection, doubtful reactors should be disposed of along with positive reactors. Doubtful reactors in previously negative herds, or in herds in which spread of infection is slow or apparently arrested, should be isolated and re-tested within 10–15 days.

Of 149 herds tested under the federal plan, 64·5% required not more than two tests, 22·7% required from 3–4 tests, and 12·7% required more than four tests. Maintenance of *abortus*-free herds required even more vigilance than the establishment of *abortus*-free herds, and the authors quote figures showing that, in observations extending over 13 years, 67 out of 218 herds became reinfected.

The authors recommend the development of a uniform Federal or state system with particular attention to the following points:– (1) reliable short-interval blood testing with immediate removal of all positive and doubtful reactors; (2) re-tests within 10–15 days of all animals giving partial reactions at 1 : 50; (3) use of maternity stalls and employment of rigid sanitary measures, and (4) extreme precautions against introduction of infection by the addition of new animals and by contacts at pasture, including quarantine and re-testing of any animals taken off the premises and returned. Area testing would be necessary. Vaccination is not favoured, as the authors consider that it is incompatible with the system of blood testing.

III. B., speaking as a layman, said that, while stockmen would welcome some curative or immunizing method, the method of eradication by destruction of reactors " was far more harmful to the beef industry than the normal prevalence of Bang's disease ". He considered that natural conditions in range or semi-range country and the method of eliminating barren cows were not conducive to the maintenance of the disease, which caused greatest damage in dairy herds and in certain pure-bred herds kept under confined conditions. The present testing programme was designed to deal with the disease in dairy herds, and was not, in B.'s opinion, applicable to the beef cattle kept on range. He considered that the economic burden of depleting herds and of the sacrifice of good producers of the best blood lines was not justifiable. Moreover, chaotic conditions resulted from the creation of innumerable state rules regulating cattle movements.

IV. In Arkansas, laws relating to Bang's disease eradication were stringent and a large amount of compulsory area testing was carried out. By this method the incidence of the disease had very materially decreased (from 24·4 to 2% in one county), and no difficulty had been experienced in cleaning herds under area control. Individual herd testing was unsatisfactory and little had been accomplished by voluntary testing. Stress was laid on the necessity for strict sanitary measures in addition to testing or vaccination.

In the course of the discussion, support for area testing was given by a representative of the state of Washington where similar favourable results had been obtained. In the state of Winconsin also, area testing was practised, but here it depended on getting a petition from 75% of cattle owners.

V. Progress in Bang's disease control was satisfactory. Area work was extending and the testing and disposal method had passed beyond the experimental stage. Its continuation on a wider scale was desirable except where range conditions made it impracticable. Legislation enacted by Congress requires the state or co-operating agency to compensate owners for reacting cattle if any federal payment is to be made to them. The amount paid by the Federal government was not to exceed that paid by the co-operating agency and was not to be more than one-third of the difference between the appraised value and the salvage. The Bureau of Animal Industry continued its work on testing official brucella antigens, and it was hoped that a standard antigen would be produced by the B.A.I.

Co-operation between states regarding the establishment of rules for inter-state and intra-state cattle movements was recommended, and uniformity in such rules was considered desirable. The committee approved the action taken by the Federal B.A.I. in having labels placed on commercial abortion vaccines showing that this material is for use only in calves. Research work being conducted on a *Brucella* strain of reduced virulence was to be encouraged.—H. E. Harbour.

Marriott, W. H. (1939). **Progress in Bang's Disease Control.**—*Canad. J. comp. Med.* **3**. 41–43.

On December 31, 1938 there were 1,830 herds under the policy. No figures are available on which to base an accurate estimate of the extent of infection in Canada. Many herds are badly infected in the dairy districts adjacent to the cities, but the outlying districts are comparatively free. Only 1·71% of 16,511 dairy cows from the arid areas of the west were positive. From a total of 70,260 cattle tested in 1938 the percentage of positive animals was 1·37, while in the previous year it was 1·72.
—R. GWATKIN.

TRUDEL, F. (1940). L'avortement contagieux des bovidés dans la Province de Québec. [**Bovine Contagious Abortion in the Province of Quebec**].—*Canad. J. comp. Med.* **4.** 14–18. [In French].

During two years, 57,953 samples of blood were tested by the tube and plate methods in 1,475 herds. The percentage of herds containing one or more positive animals was 20·4, and 4·16% of the animals tested were positive. Infected animals are tattooed or slaughtered. Every effort is made to prevent any other disposal of these animals. No compensation is paid. Details are given of the amount of infection in the various counties. Those bordering on the U.S.A. and Ontario are the most affected.—R. GWATKIN.

MCGILVRAY, C. D. (1939). **The Control of Bang's Disease (Contagious Abortion).** —*Rep. Ont. vet. Coll. 1938.* pp. 11–13.

Herds are classified as "unaffected" or "affected" according to the results of agglutination tests. Owners of unaffected herds are recommended to place them under the supervision of the Dominion Department of Agriculture for listing as Bang's disease free herds. Affected herds, to be eligible for the Dominion's voluntary control scheme, must contain not less than 10% pure-bred animals and be under the supervision of veterinarians. Three plans were formulated to cover (A) The "Introductory Stage", (B) The "Spreading Stage", and (C) The "Regressive Stage". Plan A requires the removal of reactors when these do not exceed 10%, followed by repeated aggln. tests at 30-day intervals until the herd is negative. Plan B is applied when infection exceeds 10% and necessitates the establishment of a reacting and a non-reacting herd. Plan C, entailing calfhood vaccination with an attenuated strain of *Br. abortus*, was still in the experimental stage. Only 10% of vaccinated animals continue to react after six months. Lists are given of animals tested under the various plans with their reactions.—L. M. H.

HUMPHREYS, F. A., & MOORE, T. (1941). **Studies in Relation to Brucella Abortus Infection. I. On the Occurrence of the Organism in the Blood Stream. II. On the Occurrence of the Organism in Serous Swellings or Hygromata on Cattle.**—*Canad. J. comp. Med.* **5.** 5–20.

157 g. pigs were infected by inoculation mostly with milk and fluid from hygromas. Cultures were sown from the heart blood and blood from 35 was inoculated into healthy g. pigs. *Br. abortus* was isolated in pure culture from 21 (13%) of the g. pigs, and its presence was indicated in four others by animal inoculation (total 16%). Twelve cultures grew only under increased $CO_2$, five grew only in ordinary atmosphere, and four grew in broth. None of 116 bovine blood samples, from animals naturally and artificially infected, yielded *Br. abortus* on culture.

Serous fluid from 45 hygromas on 36 positive and six negative animals was examined by cultural methods, g. pig inoculation, or both methods combined. *Br. abortus* infection was demonstrated in approximately 93% of the cases. In two negative animals the organism was recovered on culture, while in another it was demonstrated by g. pig inoculation. In one instance the organism was recovered on culture whereas g. pig inoculation gave negative results.—R. GWATKIN.

LOTHE, H. (1941). **Observations on the Use of Vaccine in a Bang's Disease Infected Herd.**—*Lederle vet. Bull.* **10.** 43–46.

By the use of vaccination with strain 19 a herd of 27 cows was freed from *Brucella abortus* infection during a period of five years. All negative non-pregnant animals were first vaccinated and subsequently all heifer calves at the age of 4–8 months. Reactors to the agglutination test were not vaccinated. At the end of the period there were 35 negative animals in the herd, whilst 74 had been removed for various reasons.—S. J. GILBERT.

LOVE, E. L. (1941). **The Standardization and Control of *Brucella abortus* Vaccine.**— *Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* p.p. 84–87.

All commercial *Br. abortus* vaccines in the

U.S.A. are prepared from strain 19 *Br. abortus*, and are tested at the Animal Disease Station of the Bureau of Animal Industry for purity, viability, density, pH concentration and possible dissociation.

Viability determinations are based on an optimum vaccinal dosage of 40–50 billion viable organisms. Samples with less than 25 billion are rejected as unsatisfactory. Density is measured by photo-electric and centrifuge tube methods.

Studies of several hundred samples indicate that the safe limits of pH for maximum viability lie between 5·9 and 6·8.

During the last four years, 2,742 batches have been tested. Of these 511 were rejected as unsatisfactory.—D. D. OGILVIE.

I. PRIESTLEY, F. W. (1940). **Some Properties of the Trichloracetic Acid Extract of *Br. abortus*, with Special Reference to Immunisation.**—*Vet. Rec.* **52.** 699–702.

II. MCEWEN, A. D., & PRIESTLEY, F. W. (1940). **The Vaccination of Guinea Pigs against *Brucella abortus* Infection with Living and Heat-Killed Suspensions.**—*Ibid.* 743–744.

I. Extracts were made from three aerobic strains, *viz*, 45, 45 (20), and 161 following the method described by BOIVIN and MESROBEANU [*V. B.* **6.** 441]. Extracts from 45 and 161 precipitated with smooth antiserum but 45 (20), a rough strain, did not react. Extract from strain 161 produced agglutinins in rabbits and the antigen was heat stable. The neutralized extract does not appear to be as toxic for mice as are similar extracts from other bacteria. The extract affords some immunization in mice against the toxic action of living bacteria. It does not produce allergic reactions in g. pigs. It is precipitable with acetone and non-dialysable through cellophane membranes. Immunity experiments in g. pigs were performed with living organisms of strain 45, neutralized extract from a virulent strain, and a mixture of both. No protection was afforded by any of these. ROMAN [*V. B.* **9.** 75.] has claimed successful immunization of g. pigs and sheep against *Brucella melitensis* using an extract of *Br. melitensis* and an avirulent *Br. abortus* strain, and in order to follow his technique, titration of the infective dose by scarification was performed. No immunization in g. pigs against *Br. abortus* could be demonstrated by the use of a mixture of extract and an avirulent strain or by either used alone.

II. The experiments were designed to test the vaccinating properties of living brucella strains 45, 45(6), 45(20), and 544, and also 544 killed by autoclaving. G. pigs were inoculated with two doses, given at 28 days' interval, of 1 c.c. of emulsion equal to tube 3 (Brown scale) as follows :– (a) strain 45, (b) strain 45 followed by 45(6), (c) strain 45 and 45(20), (d) 45 and 45 in mucin. The g. pigs were infected in three groups at different dates after vaccination and each group was again divided into three and infected with diminishing doses.

The results could not be easily interpreted, but vaccination with strain 45 followed by 45(20) gave the most satisfactory results. The dead vaccines afforded some degree of protection but less than the living ones. The vaccine strains were only isolated from five g. pigs and none of these showed the presence of the infecting strain. A prolonged course of dead vaccine gave no better result than a shorter course of treatment.—S. J. GILBERT.

CASTANEDA, M. R., & CARDENAS, C. C. (1941). **Treatment of Brucellosis with Brucella Antigens.**—*Amer. J. trop. Med.* **21.** 185–190.

An account of the treatment of 35 cases of undulant fever with an antigen consisting of a suspension of a surface culture washed, ground in a ball mill, and standardized to contain 4·27 mg. % nitrogen. The antigen was prepared from an original suspension composed of equal parts of *Br. abortus*, *Br. melitensis* and *Br. suis* culture. The aim was to combine immunization and desensitization. Symptomatic treatment was also given. It is stated that rapid and sustained improvement without severe reactions was noted.

*LINNIK, F., & KOLESNIK, N. (1938). **Pathogenicity of *Br. abortus* for Man.**—*Mikrobiol. Z.* **5.** 53–61. [In Ukrainian : German summary]. [Abst. from abst. in *Jber. Vet.-Med.* **65.** 243].

During an outbreak of bovine brucellosis on a collective farm, the farm workers were tested by the agglutination reaction. Most of them reacted positively though they showed no disease symptoms.

*PANKRATOV, A. (1939). **On the Rat Brucellosis.**—*Arch. biol. Nauk.* **53.** 90–91. [In Russian : English summary]. [Abst.

from abst. in *Jber. Vet.-Med.* **65.** 364].

Wild rats can become naturally infected with brucella and white rats can transmit the organism between man and animals. A strain isolated from a [? wild] mouse proved to be *Br. melitensis* and had a high virulence for laboratory animals.

GWATKIN, R. (1938). **Anti-*Brucella* Serum : Guinea Pig Protection Experiments.**—*Canad. J. Res.* Sect. D. **16.** 353–360. [Author's summary copied *verbatim*].

Guinea pigs were protected against infection with *Brucella abortus* by intraperitoneal injections of fresh, unpreserved, anti-abortus rabbit serum. In the first two experiments the serum-treated and control animals were exposed to infection by contact with infected guinea pigs, while in the third experiment they were exposed by instillation of the infecting organism into the eye. In the first experiment 60% of the controls and none of the treated animals were infected. In the second, 80% of the controls and 20% of the treated animals were infected. In the third, all of the treated animals were protected, while all of the controls became infected. The former method, although less certain than the latter, is worthy of consideration in experiments of this type, as it permits infection to occur in a natural manner.

DACK, G. M. (1940). **Non-Sporeforming Anaerobic Bacteria of Medical Importance.**—*Bact. Rev.* **4.** 227–259.

A good review, useful for reference, of the literature concerning the 14 species most studied and met with in routine medical bacteriology. Its chief veterinary interest lies in the description of the properties of *Fusiformis necrophorus*. Six other species of non-sporulating anaerobes, which have been found to be concerned in human diseases, are also described. Some of them are reported to be capable of causing local suppuration in laboratory animals. —J. KEPPIE.

PENFOLD, W. J., TOLHURST, J. C., & WILSON, D. (1941). **Active Immunisation against Gas Gangrene and Tetanus.**—*J. Path. Bact.* **52.** 187–201.

Experiments on the concentration of the toxin and toxoid of *Clostridium welchii* are described, followed by methods of actively immunizing g. pigs and human volunteers against gas gangrene and tetanus.

Concentrated *Cl. welchii* toxin, sterilized by Seitz filtration, was obtained by the addition of 25% NaCl and 2% glacial acetic acid to fresh toxin. After 16–18 hours at room temperature, the precipitate was collected, dissolved in dilute NaOH, rendered neutral, diluted in distilled water, and sterilized. It was not decided whether the above method or the use of $(NH_4)_2\,SO_4$ is the more reliable. The differing action of various diluents on haemolysis by the toxin of *Cl. welchii* is shown.

Comparative tests were made in g. pigs to find a method of preparing a combined immunizing agent, and the combination of crude (unprecipitated) tetanus toxoid with alum-precipitated *Cl. welchii* toxoid proved superior.

The immunization of human beings with *Cl. welchii* (Type A) alum-precipitated toxoid is discussed and its use in the army as a prophylactic is advocated.—J. KEPPIE.

GENEROSO, J. D., & SAN AGUSTIN, F. (1940). **Botulism in Ducks Along Laguna de Bay.**—*Philipp. J. anim. Indust.* **7.** 419–430.

The authors report an interesting occurrence of Type A botulism in ducks. The source of infection was the water and decaying algae in a lake. Ducks watered and swam in both sides of the lake, but only those on the east side showed serious losses. This was considered to be due to the south-west monsoon which, blowing continually, drove the algae in the lake to the eastern shore. All the affected ducks showed symptoms of leg weakness, and appeared in a comatose condition.

The experimental feeding of decaying algae and contaminated water produced botulism, the contaminated water being sufficiently potent to cause death in 48 hours. The water was cultured anaerobically, and the growth typed by a toxin-antitoxin neutralization test. The majority of cases of botulism in ducks in the U.S.A. have been found to be due to Type C toxin.—G. C. BRANDER.

CLIFTON, C. E. (1940). **The Utilization of Amino Acids and of Glucose by *Clostridium botulinum*.**—*J. Bact.* **39.** 485–497.

Studies were made of the metabolism of Types A and B *Cl. botulinum*. These forms utilized amino-acids primarily by means of the Stickland reaction, *i.e.* a coupled oxidation-reduction reaction between pairs of different amino-acids. Glucose appeared to be fermented directly, the main products of its

utilization being $CO_2$ and ethyl alcohol with subsidiary amounts of $H_2$, and acetic and lactic acids. The scheme of fermentation, however, has not yet been fully worked out as the fate of about 25% of the glucose disappearing during fermentation is at present not known. —Alfred Eden.

Kawahara, Y. (1940). **Observation on the Bacterial Flora in Endometritis of Mares.** —*Jap. J. vet. Sci.* **2.** 579–588. [In Japanese: abst. from English summary].

Eleven out of 17 sterile mares examined by K., were affected with dry endometritis and cervicitis due to mixed infection in which *Bacterium coli* predominated.

Steinhaus, E. A., & Birkeland, J. M. (1939). **Studies on the Life and Death of Bacteria. I. The Senescent Phase in Aging Cultures and the Probable Mechanisms Involved.**—*J. Bact.* **38.** 249–261.

In a study of the death rate in aging broth cultures of *Sarcina lutea* and *Serratia marcescens* and of the factors involved in the period of prolonged survival (the senescent phase), the authors showed that, contrary to general supposition, the numbers of cultivable bacteria in cultures even after incubation for two years remained remarkably high. Readjustment of the reaction of *S. marcescens* cultures from pH 9·0 to 7·0 produced a definite increase in the number of viable bacteria. Aging cells, although exhibiting colonial variation, retained their physiological and staining properties and were very resistant to adverse conditions. Of 21 strains grown on media containing large amounts of washed and autoclaved homologous bacterial cells, proteolytic organisms grew much better than non-proteolytic.—R. O. Muir.

Knaysi, C. (1941). **Observations on the Cell Division of some Yeasts and Bacteria.** —*J. Bact.* **41.** 141–152.

By a study of the behaviour, during cell division, of the cytoplasm and of the membranes surrounding the protoplasm of a yeast and certain bacteria by dark and bright ground illumination, a fundamental difference was demonstrated between the cell division of yeasts and bacteria: in the yeasts, the cytoplasmic membrane remains continuous while the material of the new cell wall is being laid down; in bacteria, the cytoplasmic membrane breaks long before evidences of cell-wall deposition are seen. A new method is described of rendering the bacterial cell wall visible. —R. O. Muir.

Gunst, J. A. (1940). Opmerkingen over "Actinomycose", naar aanleiding van een referaat. [**Comments on the Term "Actinomycosis" with Reference to Published Articles**].—*Tijdschr. Diergeneesk.* **67.** 81–83.

A brief discussion on the subject.—L. T.

## DISEASES CAUSED BY PROTOZOAN PARASITES

Harding, R. D. (1940). **The Effect of a Diet of Human Blood on *Trypanosoma brucei* Developing in *Glossina tachinoides*.**— *Ann. trop. Med. Parasit.* **34.** 97–99.

It has been suggested that *T. rhodesiense* has developed from *T. brucei* owing to a decrease in the game population having forced the tsetse fly to feed on man. H. attempted to ascertain whether the feeding of tsetse on human blood rendered developing infections of *T. brucei* any less susceptible to human serum. Specimens of *G. tachinoides* were first fed on infected g. pigs, then for six days on human volunteers, then for seven days on citrated human blood, and then again on g. pigs. The strain of trypanosomes appearing in g. pigs infected by these flies proved to be no more resistant to human serum than the parent strain, either *in vitro* or in g. pigs.—U. F. Richardson.

Schilling, C. (1939). Schutzimpfung gegen Tsetsekrankheit. [**Protective Inoculation Against Trypanosomiasis**].—*Dtsch. tierärztl. Wschr.* **47.** 576.

This note comprises a summary of information contained in an article previously abstracted [*V. B.* **10.** 828].—U. F. Richardson.

Kraneveld, F. C., & Djaenoedin, R. (1939). Het afsterven van het Trypanosoma evansi in het bloed en de organen van geslachte surra-lijders. [**Death of *T. evansi* in the Blood and Organs of Animals Affected with Surra**].—*Ned.-ind. Bl. Diergeneesk.* **51.** 218–236.

The authors refer to the legal regulations in the Dutch East Indies concerning the slaughter for food of animals with surra. Transportation and slaughter must take place only between

7 and 9 p.m., the meat being considered fit for consumption (taking into consideration its state of nourishment) if not offered for sale within ten hours of slaughter. Hides must be kept 24 hours in the dark, protected from flies, before being released for commercial treatment.

By systematic experiments carried out with ten strains of *T. evansi* obtained from horses, buffaloes, and cattle, it was shown that these measures suffice to prevent spread of the infection by blood, meat, and organs at temperatures of 23·5°–28°C. The trypanosomes die out even earlier at 28°–30°C. The number of trypanosomes in the blood is another significant factor. Material from animals slaughtered when they were scanty in the blood remained infective for a shorter period.

Trypanosomes in hides were never infective for a longer period than those in the blood and organs, and died more quickly in hides which were kept folded, as provided in the regulations.
—L. Tobback.

Nieschulz, O., & Bos, A. (1940). Ueber einige Versuche mit einem Stamm des Trypanosoma viennei aus Surinam. **[Experiments with a Strain of *T. viennei* from a Calf from Dutch Guiana].**—*Z. InfektKr. Haustiere.* **57.** 91–118.

From the results of subinoculation it is considered that *T. viennei* [the South American strain of *T. vivax*] is not infective for rats, mice, g. pigs, or dogs, but can occasionally be infective for rabbits. It has little pathogenicity for cattle and horses, but can kill goats and sheep in a few months, causing an oedema of the head. Cattle and goats may harbour the parasites for eight months or more, and animals which recover appear to acquire immunity. Attempted treatment with naganol and antimosan did not give satisfactory results; although the latter appeared to have some curative action, treated cases were subject to relapses.—U. F. Richardson.

Talice, R. V., & Osimani, J. J. (1939). Primeros mamíferos domésticos infectados por el *T. cruzi* comprobados en Fray Bentos. **[Infection by *Trypanosoma cruzi* of Domestic Animals in Fray Bentos].**—*An. Fac. Med. Montevideo.* **24.** No. 11–12. Reprint pp. 6.

The authors report the finding of three cats and one dog naturally infected with *T. cruzi*, in the town of Fray Bentos. *Triatoma infestans* is common in this district, particularly in the houses of the poor, and human infection by *T. cruzi* is not uncommon.

None of the four animals found to be infected by *T. cruzi* showed any clinical symptoms, but the authors point out that the appearance of symptoms in dogs and cats may be greatly delayed. They cite the case of a dog kept under observation for more than a year before clinical signs of the disease appeared.—M. W.

Kolodny, M. H. (1940). **The Effect of Environmental Temperature upon Experimental Trypanosomiasis (*T. cruzi*) of Rats.**—*Amer. J. Hyg.* Sect. C. **32.** 21–23.

In order to ascertain the effect of external temperature on *T. cruzi* infection of rats, groups of infected albino rats were kept at temperatures of 90°–95°F. and 40°–45°F., with control animals at 70°–74°F. The artificially high temperature did not materially alter the course of the infection, all animals recovering, but the cooled animals developed a more intense infestation of the peripheral blood, and the disease invariably terminated in death.
—U. F. Richardson.

*Bergier, P. L. (1939). Epidémiologie de la leishmaniose viscérale dans la région marseillaise. **[Epidemiology of Visceral Leishmaniasis in the Marseilles District].**—*Thesis, Marseille.* [Translation of abst. in *Pr. méd.* **48.** 194].

Visceral leishmaniasis occurs in Marseilles as much in dogs as in man; it affects especially the suburban districts and the outskirts, *i.e.*, the areas where the greatest number of dogs and ticks are found.

The incidence reached a maximum in 1932 and decreased in the course of the following years to remain stationary in recent years.

The disease attacks particularly children 1–8 years old; there appears to be no seasonal change in incidence. It is believed, at the present time, that a close relationship exists between the human and canine cases. According to B., the causal organisms in dogs and human beings seem almost certainly to be identical in the Marseilles district.

An endemic appears to exist which breaks out habitually in the dog and occasionally in man. Infection takes place through ectoparasites, probably *Phlebotomus*, ticks, or fleas. The role of *Phlebotomus*, however, although

classically admitted and based on experimental findings of incontestable value, seems rather difficult to accept without reserve, at least for the Marseilles district, when the epidemiology of the infection is considered.

CARTA, A. (1939). Osservazioni morfologiche su midollo osseo, linfoghiandole e fegato di cani con leishmaniosi e con leishmaniosi ed altre infestione associate. **[Morphology of the Bone Marrow, Lymph Nodes and Livers of Dogs Affected with Leishmaniasis and with Leishmaniasis Complicated with Other Infections].**—*Profilassi.* **12.** 210–216. [French and German summaries].

Histopathological studies are recorded on the bone marrow, lymph nodes and livers of 12 dogs infected with leishmania, four infected with both leishmania and *Ancylostoma caninum*, and one with leishmania and *Dirofilaria immitis*, and it is suggested that some of the pathological changes ascribed to leishmaniasis are in fact due to complicating infections.

The bone marrow in uncomplicated leishmaniasis was not found to have any macroscopic abnormality, whilst when ancylostomes or filariae were also present it was congested and diffluent. In all cases the l.nn. showed histiocytic mobilization, an increase of plasma cells and lymphocytes, and catarrh of the sinuses. In pure leishmanial infections and in the case complicated with filariasis, there was hyperplasia of the l.nn., and an increase of the cortical fibrous tissue. When ancylostomes were involved, the l.nn. showed hypoplasia, marked haemopoiesis, oedema, and atrophy of the connective tissue. Similarly in pure leishmaniasis the liver was macroscopically normal, and histologically showed only inflammatory foci containing the parasites, but when ancylostomes were present it was congested and enlarged, with degeneration of the parenchymatous cells and haemopoiesis. The liver of the animal infected with both leishmania and filariae was smaller, pale, and rough-surfaced, and showed considerable cirrhosis and fatty degeneration.—U. F. RICHARDSON.

ALLEN, E. A. (1941). **Macroscopic Differentiation of Lesions of Histomoniasis and Trichomoniasis in Turkeys.**—*Amer. J. vet. Res.* **2.** 214–217.

Routine examinations of smear preparations, extending over several years, from blackhead lesions of turkey livers showed numerous trichomonads and few or no histomonads. Lesions containing only trichomonads differed from those containing only histomonads although each bore superficial resemblance to the other. Lesions containing a mixture of the parasites could be distinguished macroscopically from those of pure infections of either parasite. Liver lesions associated with pure *T. gallinarum* infection show an irregular outline, granular, and either level with or slightly elevated above the liver surface. Lesions of pure *H. meleagridis* infection are circular and slightly sunk below the liver surface. Natural mixed infections of the two genera produce large, circular lesions consisting of raised granular borders surrounding markedly depressed areas. Under natural conditions infections with these protozoa may be mixed or pure and diagnosis based on the correct interpretation of lesions is of importance.—C. HORTON SMITH.

PRATT, I. (1940). **The Effect of *Eimeria tenella* (Coccidia) upon the Blood Sugar of the Chicken.**—*Trans. Amer. micr. Soc.* **69.** 31–37.

Preliminary experiments showed that there is a marked increase in the blood sugar of chickens with caecal coccidiosis. Further studies showed that this increase occurs on the fifth or sixth day after infection when there is considerable loss of blood from the caeca. The withdrawal of blood from normal chickens produced similar increases of blood sugar. Birds which were fasted for 19 hours before the determinations were made, showed a lower blood-sugar level than those fed normally, but fasting did not materially prevent the marked rise during acute coccidiosis.—C. H. S.

MARSH, H., & TUNNICLIFF, E. A. (1941). **Enteritis in Sheep Caused by Infection with the Protozoan Parasite Globidium Gilruthi.**—*Amer. J. vet. Res.* **2.** 174–177.

Enteritis, loss in weight, severe diarrhoea, and absence of fever were evident in sheep acutely infected with *Globidium gilruthi* at two ranches in the Yellowstone Valley. *G. gilruthi* has been observed in the abomasum, but in this instance the principal lesions were found in the small intestine. In one case parasites were found in large numbers in the abomasum, but no gross pathological change was evident. In a fatal case the mucosa of the small intestine

was seen to be studded, superficially and deeply, with small, white, thin-walled cysts containing large numbers of lanceolate bodies. Examination of a sheep which had died in the acute stage of the disease revealed destruction of the epithelium and villi while the outer portion of the mucosa contained a quantity of infiltrating lymphocytes and monocytes.—C. H. S.

LEVINE, N. D. (1940). **Changes in the Dimensions of *Balantidium* from Swine upon Cultivation.**—*Amer. J. Hyg.* Sect. C. **32.** 1–7.

It is suggested that *Balantidium* is sometimes pathogenic to swine, and investigations are in progress to determine the validity of the species of these ciliates occurring in swine, and whether disease is more commonly associated with one species than the other. The length : width ratio in eight strains of porcine balantidia was investigated in caecal preparations and in cultures. In all the strains a change in the ratio occurred in culture. In six cases the ratio shifted towards the round (*B. coli*) type, and in two cases towards the more elongate (*B. suis*) form.—U. F. RICHARDSON.

VIERA, O., & CASTELO, M. (1940). Conjunctivitis contagiosa por rickettsia conjuntivae en los ovinos y bovinos del Uruguay. **[Rickettsial Conjunctivitis of Sheep and Cattle in Uruguay].**—*Rev. Med. vet., B. Aires.* **22.** 30–43.

The authors report a number of cases of conjunctivitis in sheep and cattle caused by *R. conjunctivae*. Adult animals were mainly affected, the condition beginning as a mucopurulent conjunctivitis with progressive keratitis. Smears from the inflamed conjunctiva, stained by the May-Grünwald-Giemsa method, demonstrated the rickettsiae. Experimentally the disease was transmitted to sheep by introducing infective material into the eye; only material from infected sheep could infect other sheep, however, the bovine strain of rickettsia proving non-pathogenic to sheep. The sheep strain also proved non-pathogenic to bovines. The authors, therefore, consider the two strains to be distinct.—MILLER WATSON.

DERRICK, E. H., SMITH, D. J. W., BROWN, H. E., & FREEMAN, M. (1939). **The Role of the Bandicoot in the Epidemiology of "Q" Fever: A Preliminary Study.**—*Med. J. Aust.* Jan. 28th. 150–155. [Authors' summary copied *verbatim*].

The bandicoot *Isoodon torosus* Ramsay is susceptible to "Q" fever. Nine bandicoots were inoculated, and at least five became infected, as shown by the recovery of "Q" virus from the organs by guinea-pig inoculation.

Infection is of the inapparent form. The only abnormality found *post mortem* was enlargement of the spleen. Infected bandicoots had a spleen size of from 0·61% to 1·10% of the body weight. The average size of the spleens of captured bandicoots was 0·51% of the body weight.

Inoculated bandicoots developed serum agglutinins against "Q" Rickettsiae.

Of 44 uninoculated bandicoots tested for "Q" agglutination, four reacted. These had, therefore, been infected with "Q" fever in the bush. They show that the bandicoot is involved in the natural cycle of "Q" fever.

Bandicoot sera which react to agglutination tests are also capable of protecting mice and guinea-pigs against infection with "Q" fever.

The organs of 29 bandicoots were inoculated into guinea-pigs, but the infecting agent of "Q" fever was not obtained.

Bandicoots carry a variety of ectoparasites: lice, fleas, ticks and mites. A large series of these have been inoculated into guinea-pigs, without result.

DERRICK, E. H., & SMITH, D. J. W. (1940). **Studies in the Epidemiology of Q Fever. 2. The Isolation of Three Strains of *Rickettsia burneti* from the Bandicot *Isoodon torosus*.**—*Aust. J. exp. Biol. med. Sci.* **18.** 99–102.

SMITH, D. J. W. (1940). **Studies in the Epidemiology of Q Fever. 3. The Transmission of Q Fever by the Tick *Haemaphysalis humerosa*. 4. The Failure to Transmit Q Fever with the Cat-Flea *Ctenocephalides felis*.**—*Ibid.* 103–118, and 119–123.

II. It had been suspected that a small native animal, the bandicoot, was the reservoir of Q Fever, a recently described rickettsial disease of man. 109 bandicoots were captured and portions of their livers, spleens, and kidneys were inoculated into g. pigs. Three of the bandicoots were thus shown to be infected with *R. burneti*.

III. Over 50% of larval, nymphal, and adult ticks became infected when fed on infected g. pigs. Infection acquired in the immature stages was transferred through the metamor-

phoses to the adult stage. Infected ticks transferred the disease to about 25% of healthy g. pigs on which they were fed. Histological sections showed that the rickettsia were strictly confined to the intestinal epithelium and the lumen of the gut. Faeces of infected ticks were highly infectious, being capable of infecting g. pigs when applied to abraded or sound skin. These observations confirm the rickettsial nature of the pathogen.

IV. *R. burneti* was found to be incapable of survival or multiplication in the cat flea.

—W. I. B. Beveridge.

Shillinger, J. E., & Wetmore, P. W. (1938). **Sarcosporidiosis a Protozoan Disease of Wildlife.**—*Trans. 3rd N. Amer. Wildlife Conf., 1938.* pp. 898–901. Washington: American Wildlife Institute.

Many wild animals in North America are infected with sarcocysts. Heavy infestations occur in wild ducks, the breast muscles usually carrying the greatest numbers of parasites. Goss found that veal calves which he examined were free from infection and, similarly, young wild animals were unaffected. The natural channels of transmission of the parasites are unknown, but it is suggested that infection may occur through the alimentary canal and that heavier infections are likely to occur late in spring and in summer.—D. D. Ogilvie.

Coatney, G. R. (1940). **Studies on *Plasmodium relictum* in the Pigeon. I. Periodic Phenomena of the Asexual Cycle.**—*Amer. J. Hyg.* Sect. C. **31.** 15–18.

The length of the asexual cycle has been determined for five species involving nine strains of avian malaria. Eight of these studies were carried out with canary hosts and the ninth with chickens. In the present study the pigeon was used to investigate the periodic phenomena in a new strain of *P. relictum*. The precautions which were taken to ensure clean birds for experiment are described. Infections were effected by intravenous inoculations of infected blood and observations were begun 3–4 days later when the parasites were present in sufficiently large numbers. Twenty-one infections were studied. Blood smears were made at four-hour intervals in nine birds (which gave only a rough indication of the length of the asexual cycle), at three-hour intervals in ten birds and at one-hour intervals in two birds. 100–300 asexual parasites were counted at random in each smear and were classified as trophozoites (with one nucleus), young schizonts (with 2–5 nuclei), and old schizonts (with six or more nuclei). The observations showed that the synchronicity of this malarial strain was high, as there was a high occurrence of one growth stage only, and that there was a marked periodicity. The time elapsing between two successive sporulations was about 27 hours, which seems to be the only report of a strain of avian malaria in which sporulation occurs three hours later on each successive day.—C. Horton Smith.

Wolfson, F. (1940). **Successful Cultivation of Avian Plasmodia in Duck Embryos.**—*Amer. J. Hyg.* Sect. C. **32.** 60–61.

Three species of *Plasmodium*, *P. cathemerium*, *P. elongatum*, and *P. lophurae*, were successfully cultivated by inoculating infected blood from adult ducks beneath the allantoic membranes of embryos. Observations are described which prove the value of the method and show that increase in synchronicity in segmentation of *Plasmodium* occurs during the life of the parasite in the embryo. It is thought that periodicity in segmentation is related to diurnal changes in the host's environment influenced by food-intake, muscular activity, and changes in internal and external temperatures, all of which can be more easily controlled in embryos than in adult birds. As W. points out, the method of cultivation is of value in studying factors influencing the length of the asexual cycle and the degree of synchronicity in segmentation.—C. Horton Smith.

Bessemans, A., Wittebolle, P., & de Borchgrave, O. (1938). Sur les rapports sérologiques des leptospires ictéro-hémorragiques et canicoles. [**Serology of *Leptospira icterohaemorrhagiae* and *L. canicola***].—*Rev. belge Sci. méd.* **10.** 393–411.

After a short review of the literature on the serological relationship of *L. icterohaemorrhagiae* and *L. canicola*, tables are given of cross-agglutination tests with two strains of *icterohaemorrhagiae* and ten strains of *canicola* and the corresponding antisera, and the results are summarized. Both *icterohaemorrhagiae* strains and one strain named "Wien I" were lysed by the two icterohaemorrhagic antisera as well as by the Wien I antiserum, in titres of 1 : 500–1 : 16,000 and agglutinated in titres of 1 : 1,000–

1 : 40,000. All the *canicola* strains were agglutinated and lysed by high dilutions of the *canicola* antisera, but not by Wien I antiserum nor the *icterohaemorrhagiae* antisera. Co-agglutination of both *L. icterohaemorrhagiae* and *L. canicola* occurred in dilutions of *icterohaemorrhagiae* antisera and of some of the *canicola* antisera, but always in an end-titre 10–100 times less than the specific end-titre. The authors accepted lysis or agglutination by a high titre of antiserum as a specific means of differentiating *L. icterohaemorrhagiae* strains from *L. canicola* strains and assigned the Wien I strain by its serological behaviour to the *icterohaemorrhagiae* group.—R. O. Muir.

Mochtar, A., & Collier, W. A. (1939). Het leptospiraonderzoek bij honden te Batavia. [**Leptospirosis of Dogs in Batavia**].—*Ned.-ind. Bl. Diergeneesk.* **51.** 339–346. [English and German summaries]. [English summary amended].

Samples of sera from 37·5% of 152 dogs examined in Batavia gave positive agglutination and lysis reactions with various strains of leptospira. 22·4% were positive for *L. bataviae*. Leptospira were present in the kidneys of five of the dogs, *L. bataviae* in four cases and *L. pomona* in one. *L. canicola* was not isolated.

Dacorso Filho, P. (1940). Leptospirose canina. [**Leptospirosis in Dogs**].—*Hosp., Rio de J.* **18.** 797–809. [English summary].

The author states that he makes the first report of canine leptospirosis in Brazil. He describes two cases of *L. icterohaemorrhagiae* infection in dogs and describes the lesions caused. He was successful in isolating the organisms from the urine of one animal.

—Miller Watson.

Grini, O. (1940). Spirochaete-infeksjon ved bronchopneumoni hos sølvrev. [**Spirochaetal Broncho-Pneumonia in Silver Foxes**].—*Norsk VetTidsskr.* **52.** 71–74. [English and German summaries].

A case record of the P.M. examination of a silver fox dead of broncho-pneumonia. Spirochaetes were present in large numbers in the affected lung tissues. Whether they were the primary cause of death was not decided.—J. E.

## DISEASES CAUSED BY VIRUSES

Abel, A. (1940). Munn- og klauvsjukutbruddet i Norge i 1938. [**Foot and Mouth Disease in Norway in 1938**].—*Norsk VetTidsskr.* **52.** 1–30.

When the disease was approaching the northern European countries in 1938, steps were taken to keep Norway free from infection by the enactment of regulations prohibiting the import of food concentrates, seeds, plants, trees, bushes, and meat from infected countries. Persons from the latter were obliged to undergo disinfection before entering Norway, the degree depending upon the person's occupation. A systematic inspection of all pasteurizing plants in the eastern and southern parts of the country was also carried out. [A great deal of milk or skim milk is returned to the farms for stock feeding after pasteurization.] Plans were ready to stamp out the disease, should it appear.

It did appear on November 18th, 1938 in one farm in the county-district of Østfold [east of Oslo] and evidently gave rise to a secondary outbreak involving four farms. All were quickly stamped out. An independent outbreak on one farm in the same district occurred on December 13th. During the first week of December three more outbreaks occurred—in Aust-Agder, Vestfold, and Telemark. [All in the south-eastern block of country lying south and west of Oslo.] These outbreaks were all stamped out before they could spread. In no outbreak could the origin of infection be traced.

A total of 369 cattle, 249 sheep, and 921 fowls on 21 farms was slaughtered at a compensation cost of 171,000 kr., other costs of control amounting to 293,650 kr.

The author, in his conclusion, discusses the working of the successful control operations with special reference to the difficulties due to their unpopularity with the general public.

—J. E.

Piwowarczyk, S. (1939). Określanie typu zarazka pryszczycowego w epizootii pryszczycy w Polsce w 1938 roku. [**Determination of Type of Foot and Mouth Disease Virus in the Epizootic of 1938 in Poland**].—*Wiad. weteryn.* **18.** 175–184. [Abst. from French summary].

Typing of 12 strains of F. & M. virus

occurring in outbreaks in Poland proved them to be the O type.

KENDA, I. (1938). Mogućnosti i koristi cepljenja kod suzbijanja slinavke i šapa. [**Limits and Value of Vaccination against Foot and Mouth Disease (in Yugoslavia)**]. —*Arhiv. Minist. Poljopriv., Belgrade.* **5.** 60–70. [German summary].

About 40,000 farms in Yugoslavia were infected with F. & M. disease, type C, in the spring of 1938. The disease was rather severe and a great number of unweaned calves and pigs died. Some 2,000 litres of convalescent serum were used along with the usual veterinary police measures, either alone or combined with artificial infection. The question of using a vaccine is discussed.—B. OSWALD.

WALDMANN, O. (1939). Der Kampf gegen die Maul- und Klauenseuche. [**The Fight against Foot and Mouth Disease**].—*IV Congr. int. Pat. comp., 1939.* **1.** 89–105. [In German: English, French, Italian and Spanish summaries]. [English summary amended].

The spreading of the 1939 epizootic of F. & M. disease is described, the struggle against it being considered as an international problem. The fundamental measures of veterinary policy are also described. The stamping-out policy, *i.e.* slaughter of affected animals and those suspected of having been infected, as used in England, Switzerland, and the U.S.A., is opposed to the isolation methods. The results of modern research work are discussed, with particular reference to studies on immunization. The limitations of treatment with serum from recovered or hyperimmune animals are pointed out. The vaccine of WALDMANN & KÖBE is thoroughly examined and its preparation is described. W. suggests that this vaccine may be considered as efficient as the best immunization methods in virus diseases, and its large application may result in real progress. The fundamental necessity, however, for efficient protection of cattle, etc. is that the struggle against the disease be considered as a European or continental problem and that common programmes and eradication schemes be adopted by all states affected.

KÖBE, K., & WAHL, F. (1938). Weitere Untersuchungen über eine infektiositätssteigernde Komponente des Maul- und Klauenseuchevirus. [**Factors which Increase the Pathogenicity of the Virus of Foot and Mouth Disease**].—*Zbl. Bakt. I.* (*Orig.*). **142.** 353–359.

If a F. & M. disease virus is subjected to electrophoresis, the cathode attracts a certain component of the lymph, and this component has the power to increase the virulence of lymph 2–15 times. A factor of similar power is found in the blood of g. pigs actively immunized by attenuated virus adsorbate against F. & M. virus. Neither the cathode fluid nor the blood of such immunized g. pigs contains infective virus. The substance is demonstrable in the blood of g. pigs from the 5th–50th day. During this time there are no antibodies in the blood. It appears that after immunization a substance which possesses the antigenic properties of the virus but is itself non-virulent, dissociates itself from the virus adsorbate in the body of the immunized animal. Whether this substance is directly connected with the establishment of immunity is not yet clear. As the power to increase infectivity recedes, the quantity of demonstrable antibodies increases in the blood.

The opinion is expressed that the cathode fluid contains the same substance as that found in the blood of immunized g. pigs, and capable of increasing the infectivity of the F. & M. disease virus.—V. CHLÁDEK.

NAKAMURA, J. (1940). **On the Experimental Infection with Rinderpest Virus in the Rabbit. III. Neutralization Experiment.**—*Jap. J. vet. Sci.* **2.** 567–578. [In Japanese: abst. from English summary]. [For Part II, see *V. B.* **11.** 163].

A strong virus-neutralizing property of the serum of rabbits previously infected with rabbit-strain rinderpest virus was demonstrated by N., but no such potency (even no influence on M.L.D.) was found in normal rabbit sera added undiluted to virus. The serum-virus mixture was tested by subcutaneous and intravenous injections, more units of virus being inactivated by the former route. Heating the serum to 56°C. did not reduce potency. Short ($\frac{1}{2}$–1 hour) storage of the serum-virus mixture at room and incubator temperatures (17°–38°C.) or longer (20 hours) storage at 2°C. did not influence the results. The serum potency of two infected rabbits was tested before and several times after infection (fresh whole blood was tested for infectivity in normal rabbits and serum was tested for its

neutralization properties against centrifuged lymph node virus). The neutralization properties were developed five days after the virus inoculation, but the whole blood remained infective for 5–9 days longer. The potency of sera of convalescent rabbits appeared to be stable for at least four months after inoculation infection.—C. V. WATKINS.

SABIN, A. B. (1941). **The Filtrable Micro-organisms of the Pleuropneumonia Group.**—*Bact. Rev.* **5.** 1–66.

After a review of chronological additions to the pleuro-pneumonia group since the discovery of the prototype, a general description is given of diagnostic morphological and cultural criteria, growth requirements, culture preservation, mode of reproduction, growth on the chick embryo and in tissue culture, heat resistance, and modification of virulence. Details are then described of the properties of the aetiological agents of bovine pleuro-pneumonia and agalactia of sheep and goats, of the two types associated with canine distemper, the three rat types, *viz*, "$L_1$", "$L_3$", and "$L_4$", the Types A, B, C, D, and E isolated from mice, and of "pleuro-pneumonia-like" microbes found in the g. pig, in man, and in decaying material. The question of the symbiosis or variation of the "$L_1$" type and *Streptobacillus moniliformis* is considered, with a discussion of its significance for members of the group. There follow details of filtrability, estimated particle size, toxigenicity, immunological reactions, groups and types, and pathological pictures of diseases caused by members of the group. In a comparative review of the results obtained by the use of immune sera, vaccines, and chemotherapeutic agents in the treatment of diseases due to the group, it is notable that, in agalactia of sheep and goats and experimental chronic arthritis of mice, chemotherapeutic agents showed curative effects not possessed by the specific immune sera. A tentative classification and nomenclature for the pleuro-pneumonia group follows a discussion of its position in relation to viruses, rickettsia, and bacteria, and includes one saprophytic genus and five parasitic genera.—R. O. MUIR.

MITSCHERLICH. (1941). Ansteckender Katarrh der Luftwege des Pferdes. **[Infectious Respiratory Catarrh of the Horse].**—*Dtsch. tierärztl. Wschr.* **49.** 93–99.

This is a detailed account of an outbreak of infectious catarrh occurring in 176 out of 240 horses in a large horse clinic. Sixteen animals developed a broncho-pneumonia; four of these died and two others were slaughtered as incurable. The findings were those typical of "Brussels disease", which was found [*V. B.* **5.** 624.] to be due to a filtrable virus complicated by secondary bacterial infection. The condition was differentiated from strangles, equine infectious pleuro-pneumonia (*Brustseuche*), and influenza.

The incubation period of the virus infection under natural conditions in the stall was usually 2–3 days. The virus phase was characterized by pyrexia, coughing, and a serous nasal discharge. The greyish-white nasal discharge characteristic of the secondary bacterial infection and occurring from the fifth day did not appear capable of spreading infection to adjacent animals and it seems that the virus is no longer excreted at this stage in the disease. During the stage of pyrexia the blood of an infected horse was capable of transmitting the disease to a healthy animal when injected intravenously. The serous nasal secretion taken at the second day of the infection was without effect when introduced into the nasal cavity of a normal horse. Negative results were also obtained with the purulent secretion due to the secondary bacterial infection, even in a horse which had just recovered from a simple virus infection uncomplicated by secondary bacteria.

A variety of organisms was isolated from the nasal discharges and from the pneumonic lesions. It is suggested that the most important is a Gram-negative diplo-streptococcus, and its cultural and biochemical features are described. An attempt to produce with this organism a purulent rhinitis in a horse which had just recovered from a simple virus infection was successful.

Measures for dealing with an outbreak include isolation of affected animals, disinfection of stalls, and daily recording of temperatures. Symptomatic curative treatment is discussed. Some measure of success is claimed for vaccination with a mixture of the diplo-streptococcus and *Staphylococcus aureus* isolated from natural cases. A beneficial effect was obtained only in animals inoculated when in the early stage of the infection.—E. G. WHITE.

MARKOWITSCH, W. A. (1939). **Cases of Genital Vesicular Exanthema in Mares.**

—*Vet. Klin., Sofiya.* **7.** 91–94. [In Bulgarian : translation of German summary].

M. describes some cases of genital vesicular exanthema in eight mares and one stallion, and the round smooth sharply defined unpigmented spots 0·5–0·8 cm. in diameter on the skin of the genital tract, which were a sequel to the disease. They resemble the white spots which are a feature of dourine.—J. E.

MAGNUSSON, H. (1940). Något om svinpest. [**Notes on Swine Fever**].—*Svensk Vet-Tidskr.* **45.** 182–196.

Sweden has been free from S.F. for some years. Early in 1940 an outbreak occurred in Göteborg and was stamped out. As S.F. exists in adjacent countries, steps have been taken by the veterinary authorities to stamp out the disease if it should appear again in the country. M. gives a systematic description of the disease for the benefit of veterinarians who may be called upon to diagnose it.—J. E.

I. COLE, C. G., & MCBRYDE, C. N. (1941). **Field Tests of Crystal-Violet Vaccine for the Prevention of Hog Cholera.**—*Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* pp. 16–29.

II. COLE, C. G., & MCBRYDE, C. N. (1941). **Experiments with Crystal-Violet Vaccine for the Prevention of Hog Cholera.**—*J. Amer. vet. med. Ass.* **98.** 454–457.

I. The results of field tests of crystal-violet vaccine carried out between November, 1935 and October, 1940 are recorded. 236 herds containing 12,572 pigs were treated. Pigs of less than 75 lb. body weight received 5 c.c. and those of over 75 lb. 10 c.c. of vaccine. There were no local reactions. With the exception of two groups of pigs in which transient illness of an obscure nature occurred, all herds remained healthy. In order to test the immunity which developed, four pigs from each herd were injected with swine fever virus when market age was reached. Preliminary results showed that 83% of these test pigs remained normal or gave only slight reactions, 11% showed severe reactions, and 6% died or were destroyed. Subsequently it was found that uniformly successful results could not be expected in pigs vaccinated before weaning, especially if their dams were immune, and that immunity could not be relied upon in adults after eight months. Reviewed in the light of these findings, the immunity tests showed 89% normal, 10% severe reactions, and only 1% mortality.

Crystal-violet vaccination is now being employed over a wide area in a number of eastern states in the U.S.A. The greatest limitation of its use appears to be the period necessary for the establishment of immunity. For this reason it is not safe for use in the field in areas where S.F. is prevalent.

II. This is a shorter account of the same work.—D. D. OGILVIE.

HUPBAUER, A., & LUGOMER, V. (1940). Daljni rezultati s kristalvioletnom vakcinom. [**Immunization against Swine Fever by Crystal-Violet Vaccine**].—*Vet. Arhiv.* **10.** 214–224. [Translation of German summary].

Crystal-violet vaccine against S.F., used when fresh, was proved to be harmless for swine and to confer immunity against the subcutaneous injection of virus 30 days later. The vaccinated swine did not excrete virus, judging from the results of placing them for four weeks in contact with susceptible pigs.

The keeping of crystal-violet vaccine for 14 days at room temperature resulted in loss of immunizing power.

MARKO, Z. (1939). Prilog imunizaciji sisančadi imunih majka protiv svinjske kuge cepljenjem samim virusom. [**Immunity to Swine Fever in Piglets Born of Immune Sows**].—*Inaug. Diss., Zagreb.* pp. 15. [Abst. from German summary].

Piglets of sows immune against S.F. are immune at birth, but their immunity wanes as they grow. All except one of 16 such piglets, when tested by virus inoculations at 26 days of age remained well, the odd one dying from S.F.

This passive immunity in piglets can be made active by virus injections.

HUPBAUER, A. (1940). Da li se virus svinjske kuge umnaža u zajednici s virusom ovčjih boginja ? [**Multiplication of Swine Fever Virus in Association with Sheep Pox Virus in Borrel's Pustules**].—*Vet. Arhiv.* **10.** 1–6. [Abst. from German summary].

JEZIC [*V. B.* **9.** 469.] claimed that when S.F. virus was mixed with sheep pox virus and inoculated into sheep there was multiplication of the S.F. virus. H. attempted to confirm this by the same procedure. After the first injection into a sheep and the formation of the usual

Borrel pustule, virus was taken from the pustule and inoculated into two pigs in doses which would have been sublethal and lethal respectively, provided that the S.F. virus had persisted but not increased. Both pigs remained well, indicating some loss in S.F. virus. A dose calculated to contain 8,000 M.L.D., however, conveyed S.F. to another pig, indicating the persistence of S.F. virus in reduced concentration.

A second experiment showed that S.F. virus did not persist for four pox passages through sheep.

H. concludes that S.F. virus does not increase in sheep, but dies out gradually.

CAMERON, A. E. (1940). **Rabies Infection.**—*Canad. publ. Hlth J.* **31.** 424–427.

In Canada rabies in animals is a notifiable disease and is subject to control by the Dominion Department of Agriculture. Rabies has never been prevalent in Canada, but some considerable outbreaks have occurred in Ontario and Quebec. The most effective action against the disease is the licensing of all dogs and the destruction of stray dogs. When an outbreak occurs known contact dogs which have been bitten are destroyed, and suspected contacts quarantined.—P. J. G. PLUMMER.

BAKKER, S. (1940). Vertraagd verloop van rabies. **[Cases of Canine Rabies with a Long Clinical Course].**—*Ned.-ind. Bl. Diergeneesk.* **52.** 297–298.

According to the legal regulations in the Dutch East Indies, animals suspected of rabies must be kept under observation for five days. Death often occurs during this period but sometimes occurs later. The cases are described of one cat and two dogs, suspected of rabies, which died seven days, 12 days, and more than seven days respectively after the appearance of the first symptoms.—L. TOBBACK.

WILLETT, J. C., & SULKIN, S. E. (1939). **Improved Methods in the Diagnosis of Rabies.**—*J. Amer. vet. med. Ass.* **95.** 659–662. [Authors' summary copied *verbatim*].

1. The white mouse is the animal of choice in the laboratory diagnosis of rabies, Swiss mice being of no practical advantage.

2. Demonstration of Negri bodies in the test animal (white mouse) is the only dependable criterion for a positive diagnosis, since clinical manifestations are frequently too variable and indefinite to be of any value.

3. It is practical to attempt demonstration of Negri bodies by sacrificing mice on the eighth or ninth day after the inoculation.

4. The mouse-inoculation test is a more expedient means of diagnosis than the guinea pig method.

5. A simple procedure is described for demonstrating rabies virus in grossly decomposed animal brains.

6. Ether in final concentration of 10 per cent exerts a definite bactericidal effect upon contaminated dog brains after exposure for two hours at 4°C. This concentration has no effect upon the virulence of the rabies virus.

7. A simple technic is described for removing animal brains.

WEBSTER, L. T., & CASALS, J. (1941). **The Quantity of Irradiated Non-Virulent Rabies Virus Required to Immunize Mice and Dogs.**—*J. exp. Med.* **73.** 601–615. [Author's summary slightly amended].

In the experiments described it was found with respect to tissue-culture rabies virus that 1 c.c., which contains approximately 50,000 mouse intracerebral lethal doses, properly irradiated, was required to immunize a mouse; 500 c.c., which contain 25,000,000 doses, were necessary for a 20 lb. beagle dog.

Tissue-culture virus concentrated ten times proved capable of immunizing mice in a dose one-tenth as large as that required for unconcentrated culture virus.

Brain-virus suspensions were centrifuged so as to remove a large part of the tissue particles, without striking loss in the virulence of the supernatant. The centrifuged supernatants of 1–5% brain-virus suspensions were irradiated so as to destroy virulence and yet retain immunizing potency.

Irradiated supernatants of mouse-brain virus proved capable of immunizing mice as well as or better than similar supernatants treated with chloroform.

0·1 c.c. of a 1% irradiated dog-brain virus containing approximately 50,000 mouse intracerebral L.D. immunized mice effectively.

HABEL, K. (1940). **Evaluation of a Mouse Test for the Standardization of the Immunizing Power of Anti-Rabies Vaccines.**—*Publ. Hlth Rep., Wash.* **55.** 1473–1487.

No method has yet been devised for an

estimation of the protective value of rabies vaccine which is completely accurate, but the mouse technique of WEBSTER [*V. B.* **10.** 26.] is regarded as the most reliable.

A series of experiments was performed to determine the influence of the following factors on this method of assay :– strain, age, sex, and number of mice per test ; dilution of vaccine, site of injection, and number and volume of vaccine doses ; number of M.L.D. in test dose and type of virus, *viz*, street or fixed, homologous or heterologous ; route of administration of virus and interval from commencement of immunization to test dose.

As a result of these experiments the following technique is recommended.

" Thirty Swiss mice, all of one sex and preferably females, 1 month of age (11 to 13 grams) should be given 0·25 cc. of a 0·5 percent brain emulsion of the vaccine (1/10 dilution for 5 percent vaccine, 1/50 dilution for 25 percent vaccine, etc.), intraperitoneally, every second day for 6 doses. Eighteen control mice should be set aside at the start of the test. Fourteen days from the first dose of vaccine the test dose should be given to both vaccinated and control mice. In preparation for this at least 3 normal mice should be given 0·03 cc. of a 10 percent emulsion of the fixed virus strain about 7 days after the first dose of vaccine. These mice will then come down with fixed virus rabies just in time for the test dose. These 3 mice should be killed on the first day of definite symptoms and the brains should be removed and kept at 0°C. until used. On the fourteenth day these mouse brains are emulsified at 1/10 dilution by weight with 10 percent horse serum in distilled water. The 10 percent emulsion is centrifuged at 1,000 r.p.m. for 10 minutes. The supernatant is then carried through serial tenfold dilutions from $10^{-1}$ to $10^{-7}$. In order to determine the M.L.D. of the test virus the 18 control mice are divided into 3 equal groups and given, intracerebrally, 0·03 cc. of the $10^{-5}$, $10^{-6}$, and $10^{-7}$ dilutions. Groups of 6 vaccinated mice should be given 0·03 cc. intracerebrally, of the $10^{-1}$, $10^{-2}$, $10^{-3}$, $10^{-4}$, and $10^{-5}$ dilutions. These mice should be observed for 21 days and only those showing symptoms of fixed virus rabies before death should be considered as rabies deaths. The M.L.D. is the highest dilution given the control mice which causes death from rabies in at least 3 of the 6 injected mice. The end point of the immunity in the vaccinated mice is the lowest dilution of test dose virus in which at least 3 of the 6 mice tested survive. The number of M.L.D. protected against can be determined easily by the number of times the dilution giving the end point in the vaccinated mice is more concentrated than that in the controls. With irregular results 50 percent end points should be determined for control and vaccinated groups by the method of REED and MUENCH." [see *V. B.* **11.** 812].

It is suggested that an immunity in the mouse against at least 1,000 M.L.D. should be considered the minimum requirement for an efficient rabies vaccine.—R. E. GLOVER.

GIOVINE, N., & MACHADO, A. (1940). Enfermedad de Aujeszky. Observaciones realizadas en el Estado de Minas Gerais, Brasil. [**Aujeszky's Disease in Minas Geraes, Brazil**].—*Rev. Med. vet., B. Aires.* **22.** 1–29.

The authors studied 20 cases of Aujeszky's disease in Minas Geraes. The disease has apparently been known in that district for 40 years under various names. Clinical diagnosis was confirmed by biological tests.

In more than 40% of the cases the natural course of the disease was more than 48 hours and there were 10% spontaneous and complete cures. The symptomatology is described in detail of a cow which died after the disease had lasted nine days. It is stated that the disease does not run as short a course as has been suggested by some workers. In none of the cases studied were salivation or fury prominent features. In animals which lived for more than three days the pruritic patches were not confined to the site of inoculation, but were distributed over the body. The authors were unable to establish the method of transmission of the disease.—MILLER WATSON.

MOMBERG-JØRGENSEN, H. C. (1938). Parainfluenzaens Aetiologi. Infektionsforsøg med bakteriefri Gradocolmembran-Filtrater.—[**Research on the Cause of Piglet Influenza**].—*Maanedsskr. Dyrlaeg.* **50.** 193–204.

In a series of experiments the author showed that the piglet influenza virus can cause mild catarrhal changes in the lungs of young pigs infected intranasally. Virus plus a pure culture of *Haemophilus influenzae suis* caused changes similar to those caused by virus alone, whilst a coarse filtrate of lung tissue from a pig with typical influenza caused the genuine and more severe influenzal pneumonia.—J. E.

GAĬTANDZHIEV, G. (1939). **Influenza Bacteria Carriers in Swine Influenza : Presence in Healthy Slaughtered Pigs.**—*Vet. Klin., Sofiya.* **7.** 161–172. [In Bulgarian : abst. from German summary].

Pig raising is a well developed industry in Bulgaria, the most important diseases being swine fever, swine plague, and swine erysipelas. Anthrax, rabies, paratyphoid and TB. also occur.

G. describes work done in Berlin on piglet influenza, in which he isolated *Haemophilus influenzae suis* from healthy pigs. The cultural

and pathogenic properties of the organism are described. Piglet influenza and swine influenza have not been observed in Bulgaria.

ROSENBUSCH, C. T. (1939). **Some Studies on Swine Influenza. I. Comparative Study of Hemophilus influenzae suis and Hemophilus influenzae. II. Antibody Response to Experimental Swine Influenza.**—*Iowa St. Coll. J. Sci.* **14.** 73–75.

I. Fourteen strains of *H. influenzae suis* and ten human strains of *H. influenzae* were compared. R. discusses fermentation reactions and claims distinct differences between the swine and the human strains. [There is a paragraph describing the fermentation reactions, which is not clear.—ED.] Indole was not produced by any of the swine strains, but was by 50% of the human strains. Serologically, the differences were less clear-cut, although cross-agglutination tests gave sufficient differences to allow the segregation into types. It appeared that while basic differences existed between the swine and the human strains, the organisms were nevertheless closely related. From cross-aggln. studies of the homologously absorbed sera, it was shown that the swine organisms formed two sub-groups, but the significance of this finding was not determined.

II. Mice were used to determine the presence or concentration of neutralizing antibodies in the sera of pigs infected with swine influenza virus alone or with virus + *H. influenzae suis*. In cases of "filtrate disease", the antibodies made their appearance at about the seventh day after infection and rapidly attained their maximum values between the 14th and 27th days; in the one serum tested at the 84th day the value had fallen. Animals which developed typical influenzal symptoms, with temperatures of 40–41·6°C., severe cough, and laboured respiration, returned to a clinically normal condition on the appearance of antibodies. Two animals which developed only very mild symptoms showed their maximum concentration of antibodies rather more slowly. The average antibody titre of five animals tested for more than 11 days was 1 : 108.

The similarity of the antibody response to that which has been reported in human influenza is noted.—ALASTAIR N. WORDEN.

LENNETTE, E. H., & HORSFALL, F. L., Jr. (1941). **Studies on Influenza Virus. The Complement-Fixing Antigen of Influenza A and Swine Influenza Viruses.**—*J. exp. Med.* **73.** 581–599. [Authors' summary copied *verbatim*].

Influenza complement fixation tests designed for use with ferret serum are described. Complement-fixing antigens derived from influenza ferret lungs were unsatisfactory due to their low content of soluble antigen; those prepared from mouse lungs or developing chick embryo membranes proved to be better antigenically and were reliable when the various reagents in the test were properly adjusted to eliminate non-specific fixation of complement.

The results of cross complement fixation tests indicated that the soluble antigens of the PR8 and W.S. strains of influenza A virus were closely similar, if not identical. They indicated also that the soluble antigen of swine virus possessed components present in the antigens of the human strains of virus.

TAYLOR, R. M. (1941). **Experimental Infection with Influenza A Virus in Mice. The Increase in Intrapulmonary Virus after Inoculation and the Influence of Various Factors Thereon.**—*J. exp. Med.* **73.** 43–55. [Author's summary copied *verbatim*].

Following intranasal inoculation of influenza A virus (strain PR8) there is a rapid increase of the virus in the lungs which with large doses reaches a maximum within 24 hours. With smaller doses, although the proportional increase is greater, the maximum concentration is not reached until 48 hours following inoculation. If a lethal dose is administered, the ultimate concentration of the virus in the lungs is the same, irrespective of the size of the dose.

If a sublethal dose is given, the titer of the virus in the lungs does not achieve the titer reached in mice receiving a lethal dose. Within 48 hours following inoculation of a sublethal dose the lungs of a mouse may contain at least 76,000 M.L.D., yet the mouse survives.

The intranasal instillation of sterile fluid (distilled water, varying concentrations of NaCl, broth, or 10 per cent normal serum) into a mouse sublethally infected produces a sharp rise in the virus content of the lung usually followed by death within 3 to 8 days. If, however, the instillate consists of 10 per cent immune serum, there is no rise in the virus titer, and no apparent harm results from the instillation.

The implications of these phenomena are discussed and an hypothesis presented to explain their occurrence.

HORSFALL, F. L., Jr., LENNETTE, E. H., & RICKARD, E. R. (1941). **A Complex Vaccine against Influenza A Virus. Quantitative Analysis of the Antibody Response Produced in Man.**—*J. exp. Med.* **73.** 335–355. [Authors' summary copied *verbatim*].

A quantitative study of the antigenicity of various vaccines containing influenza A virus has been made in human beings. A complex vaccine prepared from chick embryos inoculated with both influenza A virus and the X strain of canine distemper virus was found to be more effective than other vaccines in stimulating the production of neutralizing antibodies against the former virus. The increased antibody levels which resulted from the administration of this vaccine remained almost unaltered for at least 5 months.

HORSFALL, F. L., Jr., & LENNETTE, E. H. (1941). **Neutralization of Influenza A Virus by Human Serum.**—*J. exp. Med.* **73.** 327–333. [Authors' summary copied *verbatim*].

A linear relationship exists between the quantity of human serum used and the quantity of influenza A virus neutralized. By means of this relationship it is possible to determine the maximum quantity of virus which a given human serum can neutralize. This quantity, the neutralizing capacity, is a fixed value and, unlike the serum dilution end point, is independent of the amount of virus used in the neutralization test.

WINTHER, O. (1939). Nogle Forsøg med Hundesygevirus (Komplementbinding og Hyperimmunisering). **[Research on Dog Distemper: Complement Fixation and Hyperimmunization].**—*Maanedsskr. Dyrlaeg.* **50.** 585–594.

The c.-f. test was used with the object of developing a method of early diagnosis in dog distemper. It was found that the test was only of value in the late and convalescent stages.

Virus was found in the spleens of ten out of 22 dogs dead or in the last stage of distemper.

Two healthy dogs were successfully immunized by spleen filtrate, one which received the virus absorbed on $Al(OH)_3$ developing a stronger immunity than the other which received spleen virus alone.—J. E.

MOMBERG-JØRGENSEN, H. C. (1938). Kattesyge. **[Cat Distemper].**—*Maanedsskr. Dyrlaeg.* **49.** 685–695.

A description of cat distemper as reported by various workers in England, North America, and elsewhere is followed by reports of an identical or similar disease which caused losses in cats in various parts of Denmark.

The author carried out a few transmission experiments on young cats with material from a naturally infected cat. He succeeded in conveying the disease by the subcutaneous injection of unfiltered material, from spleen and mesenteric lymph nodes, and in one instance by placing a kitten in contact with an artificially infected cat.—J. E.

I. EISENBERG-MERLING, K. B. (1940). **Observations on Living Vaccinia Virus in the Corneal Cells of the Rabbit.**—*J. Path. Bact.* **50.** 279–286.

II. EISENBERG-MERLING, K. B. (1940). **Further Observations on Living Vaccinia Virus.**—*Ibid.* **51.** 391–400.

I. The development of vaccinia elementary bodies was followed in the cornea of the rabbit by the dark-ground illumination of cells detached by gentle scraping and suspended in a drop of Tyrode solution between a slide and coverslip sealed with paraffin wax. It is suggested that the cycle starts with the E.B. which sink into the cytoplasm of the cells producing areas of liquefaction which coalesce to give Guarnieri bodies: they then divide into discs and spheres. These eventually rupture the cells with liberation of the contents.

The sequence of events is clearly illustrated by a series of photomicrographs, and it corresponds quite closely with the life-cycle of pleuro-pneumonia virus.

II. An attempt was made to cultivate vaccinia virus in the absence of living cells by a new type of technique in which the virus was removed from the host together with a number of cells sufficient to permit continuation of life by the use of metabolic products set free with the death of the cells. The cultures were prepared as in I and were observed up to periods of six months. The corneal cells apparently died about the fifth day, but the cycle of development of the virus bodies could be observed by ultramicroscopy. The most common form was an extrusion from an infected cell, frequently from a Guarnieri body, which sometimes took many weeks to develop.

Such specimens showed a definite increase in the number of virus bodies. Infectivity was confirmed by the inoculation of rabbits. [As subcultures were not successful it is possible that the results may have been due to persistence of virus in the cultures.]—R. E. GLOVER.

GRAHAM, R., & BRANDLY, C. A. (1940). **Immunization against Pox in Domestic Fowl.**—*Bull. Ill. agric. Exp. Sta.* No. 470. pp. 76.

The first half of this bulletin is a comprehensive survey of the literature on immunization of poultry against pox, including opinions on the relative values for prophylaxis of chemically or physically treated viruses and virulent fowl or pigeon viruses, the effect of passage of the latter two types of viruses through heterologous hosts, the properties of mixed viruses, the relationship of pox and vaccine virus, immunization of pigeons, and factors bearing upon vaccine-host relationships.

Experiments carried out at the station from 1932–36 are then described. Some thousands of chicks were vaccinated with pigeon-pox virus and later tested for their immunity against fowl pox. The exact preparation and standardization of the vaccine suspensions is described. The feather follicle method of application produced partial immunity which was uniform in young chicks for about two months and then declined without any undesirable complications. A 0·5% suspension gave results comparable to the usual 1% concentration used. Storage of desiccated pigeon-pox virus in the form of powdered scabs at 12°–15°C. for 14 months impaired its pathogenic and prophylactic properties.

When pigeon-pox virus was applied by the stick method to 3,000 chicks from one day to nine weeks old, there was little evidence of resistance at intervals of 16–180 days after vaccination, the immunity appearing to be in proportion to the degree and extent of cutaneous reaction (small compared with the follicle method).

No immunological relationship between vaccine virus and fowl-pox virus could be determined. Formalin added in concentrations as low as 0·025% inhibited the immunizing properties of fowl-pox vaccine. Vaccination of day-old chicks with fowl-pox virus was shown to be very dangerous, with a mortality of 41% of 453 healthy chicks treated. No measureable immunity to fowl-pox virus could be induced in over 250 pigeons, but immunity to pigeon-pox virus was developed in 31 other pigeons. Survivors among chicks fed *Salmonella pullorum*, when vaccinated with pigeon-pox virus by the stick method, behaved normally but similar chicks vaccinated with fowl-pox virus had a high mortality (75·4%).

The authors suggest that laying flocks not exposed to fowl pox should be vaccinated with pigeon-pox vaccine by the feather follicle method. On contaminated premises vaccination of chicks from 4–8 weeks old is recommended. In some cases fowl-pox vaccination may be advisable after pigeon-pox vaccination. The general health of the birds about the time of vaccination may largely influence pox vaccinations.—C. V. WATKINS.

ANTONIOTTI, D., & ROMAT, A. (1940). Contribución al estudio del epitelioma contagioso del canario. [**Pox in Canaries**].—*Rev. Med. vet., B. Aires.* **26.** 326–346.

The authors studied a number of cases of canary pox. The most common form is characterized by multiple growths, but there may be only one lesion. The growths are found on any part of the body where feather growth is slight, and on joints. The course of the disease is 2–75 days.

The growths are sessile, of irregular surface, and fibrous in appearance, the colour varying from yellow to purple or red. They vary from the size of a lentil to that of a hazel nut. Microscopically the growth is seen to be a lobular proliferation of epithelium, the adjacent tissue being hyperaemic and frequently haemorrhagic. Eosinophile inclusion bodies are present. The virus proved pathogenic only for canaries.—MILLER WATSON.

DURANT, A. J., & MCDOUGLE, H. C. (1939). **Investigation of Pox in Canaries.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 181–188. [Authors' summary slightly amended].

1. Canary pox causes severe losses in canaries throughout the U.S.A. 2. The disease in most cases is fatal to infected birds, death occurring quite regularly from the 10th–14th day after exposure. 3. Canary-pox virus does not immunize other birds against a fowl-pox virus. 4. Turkeys inoculated with canary pox showed a marked tissue reaction but remained otherwise healthy. 5. One canary, recovered from

natural infection, did not develop the disease when the canary virus was applied to a scarified defeathered area on its chest. 6. Attempts to produce a vaccine to protect canaries against canary pox were unsuccessful.

EATON, M. D., BECK, M. D., & PEARSON, H. E. (1941). **A Virus from Cases of Atypical Pneumonia. Relation to the Viruses of Meningopneumonitis and Psittacosis.**—*J. exp. Med.* **73.** 641–654. [Authors' summary copied *verbatim*].

From the lungs of two fatal cases and from the sputum of two non-fatal cases of atypical bronchopneumonia, a psittacosis-like virus was isolated by direct intranasal inoculation of mice. Intraperitoneal injection of the same human material into mice gave negative results. The virus has a relatively high virulence for mice by intranasal or intracerebral inoculation, but does not kill after intraperitoneal inoculation. Its virulence for Java ricebirds is low and it fails to produce a carrier state in mice and birds. Two cases showed an increase in complement-fixing antibodies to the new virus and to psittacosis. The virus is antigenically related to the viruses of meningopneumonitis and psittacosis by complement fixation and by active immunity tests in mice.

BRYAN, W. R., & BEARD, J. W. (1940). **Correlation of Frequency of Positive Inoculations with Incubation Period and Concentration of Purified Papilloma Protein.**—*J. infect. Dis.* **66.** 245–253.

Previous investigations have shown a high correlation between the concentration of purified papilloma virus protein in a standard volume used for inoculation, and the incubation period of the warts induced by it.

The amount of virus giving a 50% end point has now been determined and can be utilized as a quantitative unit for the description of the infectivity of preparations. The 50% end-point infectious unit has been correlated with the previous standard incubation period data. By means of the relation established, the 50% end-point dilution and the number of 50% end-point infectious units in any unit volume of a preparation of unknown potency, can be determined indirectly by the standard incubation period procedure. It is calculated that the 50% end-point unit corresponds to $94 \times 10^6$ virus protein molecules.—R. A. K.

## PARASITES IN RELATION TO DISEASE [GENERAL]

—. (1940). **Report of Committee on Parasitic Diseases.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 301–307.

The reports of this committee take the form of short reviews on a few selected topics relating to parasitology. In the present report, the recent advances and present outlook on the following are summarized :– skin tests for the detection of trichinosis in swine (a reliable test has not yet been found), phenothiazine as an anthelmintic, and barium antimonyl tartrate as an effective mode of treatment for poultry gapeworm infestation.—J. E.

—. (1941). **Report of Committee on Parasitic Diseases.**—*Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* pp. 135–136.

Owing to world conditions much comparative parasitology scheduled to be completed by 1942 has had to be abandoned. The preparation of a map of North America showing the distribution of pathogenic parasites will, however, be undertaken. A list of known pathogens of cattle, sheep, hogs, and horses in the U.S.A. and in Canada is appended.—D. D. OGILVIE.

CANDIOTI, A. N. (1936). Parasitosis gastro-intestinal en el caballo de carrera. **[Gastro-Intestinal Parasites of Race Horses].**—*Rev. Med. vet., B. Aires.* **18.** 736–772 and 815–850.

C. discussed the various ways in which parasites are harmful to their hosts.

He described the helminth, protozoan, and fungous parasites common in race horses, in the Argentine.—MILLER WATSON.

ACKERT, J. E. (1939). **New Knowledge of Poultry Parasites.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 197–209.

The following are included among other points brought out. *Plasmodium lophurae* has been found to be pathogenic to young chickens. Both chickens and turkeys may be attacked by species of *Trichomonas* which may be fatal to the hosts. Chickens $2\frac{1}{2}$–4 months of age develop increased resistance to the growth of tapeworms but mature fowls, in spite of their resistance, may become infested. Heavy infestations of *Ascaridia lineata* severely affect

month-old chickens. A potent age resistance to this parasite develops in normal chickens 3–4 months old. Rations deficient in vitamins A or B complex lower the natural resistance, while rations in which the protein provides a wide range of amino-acids raise it. Studies on age resistance show that the goblet cells of the small intestine may be one factor, as these increase in number with the age of the chicken up to 3–4 months.—W. J. IRONSIDE.

CAMERON, T. W. M. (1939). **The Parasitic Environment and Plan of Control.**—*Canad. J. comp. Med.* **3.** 211–217.

CAMERON, T. W. M. (1939). **Destruction of Eggs and Non-Infective Larvae.**—*Ibid.* 248–254.

CAMERON, T. W. M. (1939). **Avoidance of Infection, Destruction of Adult Parasites, Avoidance of Disease.**—*Ibid.* 310–317.

These three papers form chapters in the book entitled " The Principles of Parasite Control ", which has already been reviewed [*V. B.* **10.** 729].

## PARASITES IN RELATION TO DISEASE [ARTHROPODS]

JACKSON, C. H. N. (1941). **The Economy of a Tsetse Population.**—*Bull. ent. Res.* **32.** 53–55.

This paper summarizes the results obtained from marking experiments made with *Glossina morsitans* at Kakoma, Tanganyika Territory, from 1938–1940. It has been found that the length of life of marked flies is less than that of unmarked flies, and this appears to be due to the method of marking and not to the handling of the flies. Life is shortest in the hottest and driest time of the year, when the average male may live only two weeks against an average of 5–6 weeks in the rains. Fortunate males may live six weeks in the dry season against 20 or more weeks in the rains. Females live about twice as long as males.

Flies of both sexes are considered to live in more or less restricted ambits, the loss of marked flies from an area being very small in the later weeks after marking. It is thought, therefore, that wandering game have little influence in aiding tsetse dispersal. The ambit factor makes it necessary to reduce previous estimates of total populations which are now thought to be about 1,000 males and perhaps 2,000 females per square mile.

The activity of flies and their readiness to appear to catchers is highest in the first half of the rainy season, and lowest at the hottest time of year. The exclusion of fire from an area led to a decrease in the population until the middle of the rains, but after that an increase again occurred. It is suggested that the decrease may be due to the destruction of pupae by ants.—U. F. RICHARDSON.

RICHARDS, P. W., TANSLEY, A. G., & WATT, A. S. (1939). **The Recording of Structure, Life-Form and Flora of Tropical Forest Communities as a Basis for their Classification.**—Institute Paper No. 19. Oxford: Imperial Forestry Institute, University of Oxford. [1s.] [Abst. in *Trop. Dis. Bull.* **37.** 699, copied *verbatim*. Signed: P. A. BUXTON].

Those who deal with *Glossina* in the field know how closely its biology and distribution are associated with particular types of forest. They also know how difficult it is to describe the types of forest and to arrive at any useful system of nomenclature. Some of the terms in use are based on the prevalent tree, for instance " *Isoberlinia-Brachystegia* association"; others are physical such as flood plain; others again are general, for example, savannah, orchard-bush, or kurimi.

The authors of the present bulletin are botanists, interested in this problem of devising an acceptable, reasonable system of names for different types of woodland in the tropics. They discuss the problem, but put forward no system of names or definitions. They provide an interesting list of forty-two points, which ought to be considered by anyone attempting to describe a type of tropical woodland.

The matter is clearly one for the botanists. It is hoped that the entomologists may as far as possible fall into line.

GWATKIN, R., & FALLIS, A. M. (1938). **Bactericidal and Antigenic Qualities of the Washings of Blowfly Maggots.**—*Canad. J. Res.* Sect. D. **16.** 343–352.

The authors state that washings of mixtures of blowfly maggots showed *in vitro* bactericidal activity against *Staphylococcus aureus*, *Strepto-*

*coccus agalactiae*, *Brucella abortus*, and *Salmonella typhi*, the tests being carried out by the method used for phenol-coefficient determination. Washings from flies bred in the laboratory became progressively less active with each generation. Intraperitoneal injections of washings into g. pigs caused a fall in temperature and often death.—T. W. M. CAMERON.

CARRICK, R., & BULLOUGH, W. S. (1940). **The Feeding of the Tick, *Ixodes ricinus* L., in Relation to the Reproduction Condition of the Host [Hedgehog].**—*Parasitology*. **32**. 313–317.

It was found that susceptibility to infestation was not related to the reproductive condition of the host animal, and the amount of sex hormone in the host's blood had no apparent immediate effect on the fecundity of the tick. —W. MOORE.

STEWART, W. L. (1941). **The Sheep Tick. A Survey of Conditions in the Four Northern Counties of England.**—*J. R. agric. Soc.* **101**. 57–62.

In 1939, the death rates in ewes, hogs, and lambs on tick-infested grazings in the north of England were, respectively, 1½, 4, and 5 times greater than the corresponding losses on tick-free farms. Tick-borne diseases are believed to have been responsible for much of this loss. The most urgent problem is tick control in the long-established tick areas, involving a policy of land improvement and dipping.—W. MOORE.

—. (1941). **Report of the Research Committee on The Control of Sheep Tick [Royal Agricultural Society of England].** —*J. R. agric. Soc.* **101**. 83–87.

There are roughly 800 sq. miles of tick-infested grazings in the north of England and, given the conditions of ground suitability and opportunity, ticks are still spreading to land hitherto considered to be tick-free. Spread is a comparatively slow process, caused chiefly by sheep farming. It appears that spread can be reasonably controlled by efficient fencing of sheep, together with dipping (if necessary) when sheep are moved. Experiments on delayed stocking show that the seasonal rhythm of tick activity is independent of host availability.—W. MOORE.

TAYLOR, A. W., HOLMAN, H. H., & GORDON, W. S. (1941). **Attempts to Reproduce the Pyaemia Associated with Tick-Bite. Part I.—The Nature of the Infections Produced. Part II.—Comparison of the Blood Picture of the Different Infections.** —*Vet. Rec.* **53**. 337–344.

The pyaemia which is common in lambs on tick-infested pasture, occurring at the period of maximum tick activity, is frequently associated with other diseases such as louping-ill (L.I.) and tick-borne fever (T.B.F.). *Staphylococcus aureus* can invariably be isolated from the abscesses, both deep-seated and superficial, but subcutaneous inoculation of lambs with this organism produces only a local abscess. The authors attempted to determine whether the debilitating effect of L.I., with or without T.B.F. might allow of the development of a pyaemia following artificial infection with *Staph. aureus*.

Seven groups of three lambs each were inoculated with (1) *Staph. aureus*, (2) T.B.F., (3) L.I., (4) T.B.F. followed by L.I., (5) T.B.F. followed by *Staph. aureus*, (6) L.I. followed by *Staph. aureus*, and (7) T.B.F. followed by L.I. and then by *Staph. aureus*. Temperatures were recorded daily for 25 days. Blood samples were taken from surviving animals and examined culturally for staphylococci, microscopically for T.B.F. and for staphylococci, and by mouse inoculation for L.I. Haematological investigations were also carried out. Inoculations with *Staph. aureus* resulted in the formation of a local abscess only, and there was no generalization of infection, either in normal lambs or in lambs infected with L.I. and/or T.B.F. Haematological investigations are recorded fully and involved the making of total and differential leucocyte counts, and the estimation of haemoglobin, to obtain a comparison of the blood picture of the different infections. It became apparent that the reactions resulting from the various inocula employed all tended to conform to a common pattern and, although there were differences in degree, the blood picture was of no practical value as a means of differential diagnosis between the infections. —H. E. HARBOUR.

MAIL, G. A. (1940). **The Paralysis Tick *Dermacentor andersoni* Stiles. Its Life-history and Control.**—*Publ. Dep. Agric. Canad.* No. 692. pp. 4.

This paper describes the life-cycle, distribution and range in Canada, and methods of control, of the common dog tick, *D. andersoni*. This tick is the only species which has been

reported to cause paralysis in man or domestic animals in Canada.—W. MOORE.

—. (1940). **Report of Committee on Tick Eradication in 1939.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 275–276.

During 1939, tick eradication was continued and progress made in all infested areas in the U.S.A. and in Puerto Rico, and systematic work was inaugurated in the United States Virgin Islands. The years' activities will have resulted in the release of 7,155 sq. miles of territory in Florida and Texas and 1,247 sq. miles in Puerto Rico, and will have reduced the area remaining in quarantine to a little more than 10% of the original tick-infested territory. —W. MOORE.

—. (1939). Reglamenta el poder ejecutivo la ley que hace obligatoria la lucha contra la garrapata. [**Argentina : Regulations on the Control of Ticks**].—*An. Soc. rur. argent.* **73.** 139–148.

An account of recent legislation governing the control of ticks. For the purpose the country was divided into three zones, *viz*, one in which ticks were present in large numbers but were not being dealt with, a second in which ticks were to be dealt with under the regulations, and a third in which there was no tick problem.

In tick-infested areas the regulations imposed compulsory dipping at specified intervals in properly constructed dipping tanks. During the periods of maximum tick activity (November–June) all cattle, horses, and sheep must be dipped at intervals specified by the authorities. The interval was usually 15 days, but might be altered when circumstances made dipping inconvenient or dangerous. During the remainder of the year the animals must be dipped at intervals not exceeding 40 days.

For control purposes properties were to be classified in accordance with the degree of infestation.

Although there were areas in which dipping was not made compulsory, stock owners in these areas were to be given advice and assistance in combating the tick menace. Cattle from tick-infested areas must not be transported to tick-free areas, and owners of properties in tick-free areas must immediately report any appearance of ticks in their district.

Satisfactory dips were to be provided free to owners of stock who could not afford to buy them, and the authorities were to construct dipping baths and tanks wherever necessary. The regulations stipulated the strength of dips to be used, and the authorities gave advice on the use of arsenical dips.—MILLER WATSON.

## PARASITES IN RELATION TO DISEASE [HELMINTHS]

DATTA, S. C. A. (1939). **New Researches on Some Helminthic Diseases of India.**—*Rep. 13th int. vet. Congr. 1938.* **1.** 720–732. [In English : French, German and Italian summaries. Discussion pp. 732–733 in German].

D. discusses some of the more recent findings on diseases of helminthic origin, including bovine nasal granuloma due to *Schistoma nasalis*; liver lesions in debilitated equines associated with *S. indicum*; bursati in horses due to *Habronema muscae* infection; equine "lichen tropicus", considered by D. [*V. B.* **10.** 525 and 935.] to be of microfilarial origin and differentiated from "dourine-like plaques" due to *Parafilaria multipapillosa*; hump sores of cattle, in which D. had recently demonstrated adults and larvae of *Stephanofilaria assamensis*; a recurrent ophthalmia of horses, distinct from *Thelazia* infection, which was believed to be a microfilariasis, possibly due to *Onchocerca* sp., although unsheathed larvae only had been recorded. Another microfilarial dermatitis in a bullock was described, but the worm had not then been identified.—M. L. B.

FALLIS, A. M. (1938). **A Study of the Helminth Parasites of Lambs in Ontario.** —*Trans. roy. Soc. Can.* **22.** 81–128.

F. has studied in great detail the parasites of 144 lambs from south-eastern Ontario. The general picture is not significantly different from that reported by SWALES [*V. B.* **11.** 696]. —T. W. M. CAMERON.

DE JESUS, Z. (1938). **The Destruction of Lymnaea philippinensis for the Control and Eradication of Fascioliasis in Ruminants.**—*Philipp. J. anim. Indust.* **5.** 581–595.

The common liver flukes of cattle, water

buffaloes, sheep, and goats in the Philippines are *Fasciola hepatica* and *F. gigantica*, both being carried by *L. philippinensis*. From numerous observations and experiments on the control of the mollusc, the author points out that the snail and its eggs cannot resist drying and that the domestic duck readily eats the snail and is an efficient natural eradicator of the mollusc. Although air-slaked lime at the rate of 100 g. per sq. metre was ineffective, copper sulphate, in a 1 : 1,000,000 solution or as a dust at the rate of 1·5 g. per sq. metre, gave good results under field conditions. The author recommends the dusting method for ponds, swamps, and streams since it was found not to affect fish.—J. N. OLDHAM.

McLEOD, J. A. (1940). **Studies on Cercarial Dermatitis and the Trematode Family Schistosomatidae in Manitoba.**—*Canad. J. Res.* Sect. D. **18.** 1–28.

The author has found that the three species of schistosome cercariae responsible for human dermatitis in Manitoba have water birds as their definitive hosts. 460 rabbits, 240 ground squirrels (three species), 36 muskrats, and representatives of the majority of other wild mammals of the locality, were examined without evidence of infection being found. Five mice and three kittens exposed to infective cercariae failed to develop blood schistosomes.—E. S.

FIEBIGER, W., & TEMPEL, D. (1939). Zur Bekämpfung der Taenia saginata. Ein Beispiel für die notwendige Zusammenarbeit von Human- und Veterinärmedizin. I. II. **[Campaign against *T. saginata*. I & II].**—*Dtsch. med. Wschr.* **65.** 422–423.

I. Commenting on the increase of human *T. saginata* infection in Germany in recent years, F. stated that the value of cattle condemned at meat inspection because of *Cysticercus bovis* infestation amounted annually to about 2,000,000 RM. Control measures from the medical viewpoint were usually limited to chemotherapy of infected persons. F. asked for new and more effective means of control, including a campaign to secure the burning of tapeworms removed by treatment, in order to prevent such worms from starting a new cycle of infection.

II. T. stated the responsibilities of the farmer, the veterinarian, and the doctor, in the control of beef tapeworm. The farmer's care must be to prevent infestation of his cattle by keeping them from fodder contaminated in any way by human faecal material or sewage. In this connexion were mentioned the disappointing results of an earlier control order, under which infected farm personnel received a premium of 10 RM. after successful therapy. The veterinarian must play his part in detecting infestation in live cattle and at meat inspection, and in tracing back, wherever possible, to the human source of infestation. He must also decide whether an infested carcass is or is not likely to be suitable for human consumption after cold storage or treatment, and if not, he must supervise its disposal. T. pointed out that a lightly infested carcass is well worth the trouble and expense of rendering it safe for food, since the infestation may occur in stock which is otherwise in prime, fat condition.

In order to ensure the best control of the parasite, T. urged that a scheme of free therapy of infected human beings be launched, the doctor or apothecary being reimbursed by the State upon presentation for destruction of a tapeworm complete with scolex.—E. S.

ZIMMERMAN, H. R. (1937). **Life-History Studies on Cestodes of the Genus *Dipylidium* from the Dog.**—*Z. Parasitenk.* **9.** 717–729. [In English].

As a result of numerous feeding experiments, Z. confirms the view that both the dog and cat fleas act as intermediate hosts of this cestode. *Trichodectes canis* does not appear to be the usual vector, but serves as the intermediate host of *D. sexcoronatum*. The larval stages as they occur in *T. canis* are described, and the differences between cysticercoids from the flea and from the louse are indicated.—M. L. BINGHAM.

SENEKJI, H. A. (1941). **Polysaccharide Scolex Antigen for the Immunological Diagnosis of Hydatid Disease.**—*Trans. R. Soc. trop. Med. Hyg.* **34.** 401–403.

A polysaccharide with specific antigenic properties has been extracted from hydatid scolices by N/4 trichloracetic acid. Reliable and uniform results have been obtained by the Casoni test, made by injecting 0·25 mg. of the antigen in 0·1 c.c. solution. Less satisfactory results have been obtained by precipitin tests, for which 1 : 400 and 1 : 4,000 concentrations of the polysaccharide, using a constant volume of the antiserum, are recommended.—M. L. B.

I. GRIFFITHS, H. J. (1940). **Studies on**

*Strongyloides agoutii* **sp. nov. from the Agouti (*Dasyprocta agouti*).—*Canad. J. Res.* Sect. D. 18. 173–190.**

II. GRIFFITHS, H. J. (1940). **Experimental Studies on *Strongyloides agoutii* in the Guinea Pig and Other Laboratory Animals.**—*Ibid.* 307–324.

I. G. described a new species of *Strongyloides* from the agouti from Trinidad. Its life-cycle was found (over a period of three years' study) to involve an indirect type of development.

II. Continuing his studies with this species, G. found that it easily infects g. pigs. In these animals, however, instead of a predominantly indirect type of development prevailing, free males and infective larvae developed in the faeces. The parasite developed indirectly, however, when ova from g. pig faeces were transferred to sterile agouti faeces. The g. pig develops an absolute acquired immunity to reinfection.—T. W. M. CAMERON.

I. LEE, J. E. S. (1941). **An Outbreak of Trichiniasis in Wolverhampton and District. A Clinical Account of Seven Cases.**—*Brit. med. J.* Feb. 15th. 237–240.

II. GARROD, L. P., & MACLEAN, D. (1941). **Trichiniasis in Hertfordshire.**—*Ibid.* 240–241.

III. ANON. (1941). **Trichiniasis in England Now.**—*Ibid.* 245–246.

I. L. describes in detail seven cases of acute trichinosis presenting atypical features which were seen early in the Wolverhampton outbreak of 1940.

II. The clinical histories are detailed of five cases of trichinosis which were diagnosed at Harpenden in January 1941. Although several similar suspected cases were seen they were not confirmed by laboratory investigations.

III. This annotation deals with the Wolverhampton outbreak in December 1940, in which some 500 cases were involved, and with other cases diagnosed in Hertfordshire in 1941. It is noted that the clinical picture, which is sketched, departs from the usual description in several ways. Since sausages are chiefly suspect it is strongly urged that all pork and pork products should everywhere be thoroughly cooked and a warning against the dangerous practice of eating raw sausage be widely issued.
—J. N. OLDHAM.

WRIGHT, W. H. (1940). **Studies on Trichinosis. XIV. A Survey of Municipal Garbage Disposal Methods as Related to the Spread of Trichinosis.**—*Publ. Hlth Rep., Wash.* **55.** 1069–1077. [For previous parts, see *V. B.* **11.** 33].

There is a relatively high incidence of trichinosis in various population groups in the U.S.A. Autopsies show that one person in six examined from urban districts is infected, whilst from rural districts only 4% of 122 P.M. examinations were positive.

A survey shows that the highest incidence of trichinosis is in those districts where garbage is disposed of by feeding it uncooked to pigs. This is the usual method of disposal in small communities since it is the most economical.

It is assumed that the high infestation of the human population in urban areas is related to the method of garbage disposal. Pigs from these districts may be slaughtered and consumed locally to avoid condemnations which might result if the swine were sent to federally inspected abattoirs. Such pigs are often used for the manufacture of products which may be eaten in the raw state.

It is contended that cost should not be the prime factor in garbage disposal, and that if garbage is used for pig feeding it should first be adequately cooked and that this should be made compulsory.—H. E. BYWATER.

MCNAUGHT, J. B., & ZAPATA, E. M. (1940). **Incidence of *Trichinella spiralis* in Garbage-Fed Hogs in San Francisco.**—*Proc. Soc. exp. Biol., N.Y.* **45.** 701–704.

The diaphragms of 495 garbage-fed pigs were examined for trichinae and 20 (4%) were found to be infected. Only eight were positive by the press method (normally used in meat inspection), but 19 were positive when the concentrated sediment from digestion of diaphragms in artificial gastric juice was examined. This percentage is in accord with the results of HALL [*V. B.* **11.** 33.] and SCHWARTZ [*V. B.* **9.** 94, and **10.** 205.] from garbage-fed pigs elsewhere in the U.S.A., but is lower than the previously recorded result in San Francisco (15%). This reduction may be due in some measure to the introduction of rodent control.

The incidence is considerably lower than that found in human beings in San Francisco, which may be due to the fact that many persons may become infected from a single pig. The

incidence in pigs, however, is 20 times higher than that found in Canada where all garbage fed to swine has to be boiled.—H. E. BYWATER.

LYSTER, L. L. (1940). **On the Use of Commercial Papain for the Digestion of Trichinosed Meat.**—*Canad. J. comp. Med.* **4.** 73–75.

L. shows that commercial papain, at a strength of 0·1 g. in 313 c.c. of normal saline per 100 g. of tissue, is a satisfactory medium for the digestion of trichinosed meat for survey work. As some larvae are not excysted, this technique is less satisfactory for the preparation of test antigen; larvae, however, which are completely released by papain digestion are quite satisfactory for antigen preparation.

—T. W. M. CAMERON.

OLIVER-GONZÁLEZ, J. (1940). **The in vitro Action of Immune Serum on the Larvae and Adults of** *Trichinella spiralis*.—*J. infect. Dis.* **67.** 292–300.

The effects of specific immune and hyperimmune sera from rats, g. pigs, and rabbits were studied *in vitro* on larval and adult trichinae. As a result of the action of the immune and hyperimmune sera, precipitates were formed around the oral cavity of the larvae and, in addition, around the anus and vulva of the adults, which led to their immobilization, disintegration, and death. The immune serum appeared to have a stronger action on the larvae than on the adults, a fact which may bear some relation to the mechanism of immunity to reinfection. The time at which the precipitates appeared varied with the degree of immunization; they appeared earlier and were denser in hyperimmune than in immune serum. Precipitates appeared in immune serum which was untreated, inactivated, and inactivated with complement, but not in normal serum or in *Cysticercus crassicollis* antiserum. Serum from rabbits immunized with powdered larvae had a marked action on the larvae, but had little or no effect on the adults.—M. L. BINGHAM.

MILLER, M. J. (1939). **Studies on Embryonation and Hatching of the Eggs of the Dog Whipworm,** *Trichocephalus vulpis*. —*Proc. Soc. exp. Biol., N.Y.* **42.** 303–305.

It was found that development of *T. vulpis* eggs was stimulated by previous subjection to mechanical agitation by centrifugation and to immersion in brine. Low dilutions (N/1,000–N/10) of sodium chloride also stimulated embryonation, but development was inhibited by high concentrations (1-3N). It is possible that other salts present in soil in low concentrations may also influence embryonation. Eggs did not hatch in artificial gastric juice, but 25–50% hatched after 20 hours in gastric juice followed by two hours in artificial pancreatic juice. Thus, the rapidity with which eggs pass through the stomach of the host may influence the rate of hatching.—M. L. BINGHAM.

LUCKER, J. T. (1941). **Notes on the Survival of Infective Horse Strongyle Larvae.**—*Proc. helminth. Soc. Wash.* **8.** 11–13.

Observations on the survival of infective horse strongyle larvae in different soils have already been recorded [*V. B.* **9.** 400.], and further experiments to test the effect of temperature on developing larvae are here described. Infective larvae in a small quantity of water were placed on soil in small corked bottles containing approximately equal amounts of moist, sterilized, sandy clay loam. It was found that the larvae survived longer at mean temperatures of −5°C. and 3°C. than at room or higher temperatures. Another experiment showed that, in summer, the digging in of freshly passed faeces spread out on the soil surface left very few larvae in the newly turned surface. Within a month, about 50% of the buried larvae reached the surface, but they had practically disappeared after 3–4 months.

—M. L. BINGHAM.

WHITLOCK, J. H. (1940). **Studies upon** *Strongylus vulgaris*. **IV. A Method of Determining the Endpoint of the Reaction of a Lethal Agent against Adults in vitro. V. In vitro Toxicity of Copper Sulphate and the Cupric Halides.**—*J. Parasit.* **26.** 45–47 and 49–57. [For previous parts, see *V. B.* **10.** 648].

IV. An instrument, which can be used to determine the onset of rigor mortis in *S. vulgaris*, is described with the aid of a diagram. It consists essentially of a bar, suspended from an axle, to one end of which is soldered a hook; upward pressure on this hook closes an electrical contact at the opposite end of the bar. A steel strip spring is attached to the bar close to the axle, the amount of tension on the spring being delicately regulated by a set screw operating against its free end. The instrument

can thus be adjusted so that a known pressure on the hook will close the contact at a given temperature. To measure the degree of rigor mortis the instrument is applied, at an angle, to the parasite, and if the body bends before the click caused by the electrical contact, the parasite is alive; if the body is still resisting the pressure when the click occurs the parasite is considered to be dead. [No details are given on the manipulation of the parasites for this operation.]

V. The action was tested *in vitro* of copper sulphate, chloride, fluoride, and bromide against *S. vulgaris*. The toxicity of these compounds appeared to be regulated by (1) the amount of soluble copper available and (2) the toxicity of the anion joined with the copper ion. The first factor probably depends *in vivo* upon the amount of carbonate present in the alimentary canal, thus the simple compounds will be effective anthelmintics only in acid environments such as the abomasum, *e.g.* the effectiveness of copper sulphate against *Haemonchus contortus*. Copper fluoride was the most effective poison of the salts tested, but it was the most erratic in action. The marked consistency noted in these results by the use of the "time-action experimental method" indicates that the method may be of value in future comparative tests on other anthelmintic compounds.—M. L. BINGHAM.

PARNELL, I. W. (1939). **Some Notes on the Chemical Control of the Free-Living Stages of Bursate Nematodes.**—*Canad. J. comp. Med.* **3.** 84–87.

Reviewing the available information on chemical control of the larvae of horse sclerostomes, P. holds that manure in middens can be successfully treated with urea or with some fertilizers to destroy sclerostomes, but that there is no chemical which can yet be recommended for use on pastures or in stables.

—T. W. M. CAMERON.

WICKWARE, A. B. (1940). **Effects of Freezing Temperatures on the Embryonation of Eggs and Infectivity of Larvae of Heterakis gallinae.**—*Canad. J. comp. Med.* **4.** 110–116.

W. found that the eggs of the caecal worm of poultry resisted freezing for as long as 172 days, but that a smaller number became infective than in the case of the controls.

—T. W. M. CAMERON.

JANICKI, M. J. (1939). Darmtreponematosis bei einem Parasit des Hundes (Dioctophyme renale) Goeze 1782. [**Spirochaete Infection in a Dog Parasite (*D. renale*)**].—*Z. Parasitenk.* **10.** 714–718.

Giemsa staining of sections of a specimen of *D. renale*, collected from the peritoneal cavity of a four-year-old dog, revealed the presence of spirochaetes in the lumen of the intestine, and in the epithelial fringe of the intestinal wall. The organisms occurred only in the anterior part of the worm's intestine, those in the lumen being congregated into masses, and those in the epithelial fringe lying parallel to each other with their posterior ends projecting into the lumen. As the spirochaetes were seen only in sections, and no investigation could be made into their motility or into their cultural or serological characteristics, no opinion could be given as to their classification, but it is pointed out that the discovery is interesting in view of the existence of various forms of canine spirochaetosis, and the possibility that *D. renale* may act as a vector.—U. F. RICHARDSON.

PIRES, A. (1938–39). Estudio experimental sobre la "Llaga de Verano". [**Study of "Summer Sores"**].—*Rev. Med. vet., B. Aires.* **20.** 397–422 and 489–511; **21.** 143–157, 206–241 and 271–297.

P. attempted to establish the part that *Habronema* larvae play in the causation of summer sores. From a large number of horses examined he was able to find only one larva of *H. muscae* in a sore, and microscopic examination of numerous histological sections also failed to reveal larvae in the great majority of cases. The ulcers were infected by streptococci, staphylococci, *Bacterium coli* and other common organisms of cutaneous lesions. Cryptococci were not found.

The methods employed for obtaining *Habronema* larvae from flies and from faeces are described in detail.

From his work, P. was unable to find any direct relationship between gastric habronemiasis and summer sores. Eosinophilia is no guide to the diagnosis of summer sores, since horses completely free from this condition and other cutaneous lesions may have marked oesinophilia if they carry internal parasites. There are also other cutaneous conditions which are accompanied by eosinophilia.

P. failed to produce summer sores by

experimental methods using larvae of *H. muscae* and flies carrying the larvae. In a similar way no relationship between this condition and *H. megastomum* infestation could be established. —Miller Watson.

Jerstad, A. C. (1940). **A Review of the Life History of Spirocerca Lupi (= S. Sanguinolenta), the Esophageal Worm of the Dog.**—*Amer. J. vet. Res.* **1.** 73–75.

J. reviews the literature concerning the life-history of *S. sanguinolenta*. He disagrees with the view expressed by Mundhenk & Greene [*V. B.* **10.** 525.] that this species produces microfilariae in the bloodstream, but agrees with the findings of Seurat and of Faust that embryonated eggs are passed in the faeces of the host and hatch after ingestion by a suitable coprophagous beetle, in which the larvae encyst and become infective for the final host. On being swallowed the larvae are liberated into the stomach and migrate to the oesophagus *via* the walls of the gastric, gastro-epiploic and coeliac arteries, and finally of the upper part of the thoracic aorta. These larvae, which do not migrate through the capillary circulation, are quite distinct from the microfilariae described by Mundhenk and Greene.—M. L. Bingham.

Srivastava, H. D. (1939). **Studies on the Helminth Parasites of Indian Poultry. Part III. The Occurrence of Two Spirurid Stomach Worms in Fowls.**—*Indian J. vet. Sci.* **9.** 225–227. [For part II, see *V. B.* **10.** 849].

The two parasites are *Cheilospirura hamulosa* and *Tetrameres fissispina*.—W. J. Ironside.

## IMMUNITY

Mastrofrancisco, N., & Raimo, H. F. (1940). Diagnóstico da tuberculose aviária pela tuberculina. **[Diagnosis of Avian TB. by Tuberculin].**—*Rev. industr. Anim.* **3.** No. 1. 70–97. [English and French summaries.]

This is an account of a number of tests carried out with avian tuberculin in the diagnosis of avian TB. The preparation of the tuberculin and the methods of work are described. Numerous autopsies were carried out, and the authors conclude that the method is satisfactory. No new knowledge is contributed.—Miller Watson.

Wong, S. C., & Ouyang, G. (1940). **Studies on Purified Tuberculin Prepared from Bacterial Bodies.**—*Proc. Soc. exp. Biol., N.Y.* **45.** 845–848.

*Mycobacterium tuberculosis* was grown on Wong-Weinzirl synthetic medium for four weeks, the liquid portion decanted, the flasks replenished with half the original volume of sterile 0·05 N NaOH, and reincubated. Frequent microscopic examination showed nearly complete cellular disintegration in a fortnight, as compared with very slight autolysis in sterile water controls. P.P.D. prepared from these flasks by a modified Leibert technique showed similar biological properties to Leibert P.P.D. when Mantoux-tested on the human subject, provided that the alkaline autolysates were slightly acidified (pH 6·0–6·5) before steam heating. If left alkaline during the steaming process, the biological characters were destroyed. The yield of P.P.D. obtained from the alkaline autolysate was about seven times that obtained from the original decanted medium *i.e.* 0·5 g. per 10 flasks of 300 c.c. each, as compared with 0·15 g. per 20 flasks.

It is concluded that somatic tuberculo-protein is suitable for preparation of purified tuberculin and that a greater yield is obtained in a short time if the organisms are treated with dilute alkali. It is also suggested that the evidence identifies tuberculin with bacillary tuberculo-protein, since the protein prepared from the cells and from the soluble portion of the whole culture presented similar chemical and biological properties.

[It is not clear what the final yield would have been if the organisms had been allowed to undergo prolonged autolysis in the ordinary way in contact with the medium, *i.e.* whether the gain is merely time or whether the total yield of P.P.D. is increased by cellular disintegration in 0·05 N NaOH. The weight of bacterial growth is not specific and a total yield of 1·15 g. P.P.D. from 6 litres of synthetic medium is small even by the ordinary technique.]—H. H. Green.

Laporte, R. (1940). Sur les propriétés allergisantes des bacilles paratuberculeux. **[Allergic Properties of Paratubercle Bacilli].**—*C. R. Soc. Biol. Paris.* **133.** 577–579.

Groups of 20 g. pigs were injected intra-

peritoneally with aqueous suspensions of four species of paratubercle bacilli and an equal number of groups subcutaneously with suspensions in liquid paraffin. Other groups of g. pigs were injected subcutaneously with a small dose of live, virulent, bovine type tubercle bacilli, a large dose of killed bovine type tubercle bacilli suspended in liquid paraffin, or the same dose of a similar suspension of BCG bacilli. Comparative intradermal tests made after two months with the four corresponding paratuberculins and with crude tuberculin showed that tuberculous g. pigs were almost as allergic to the paratuberculins as to tuberculin, that the allergic state produced in g. pigs by paratubercle bacilli was just as intense and more specific than that produced by tubercle bacilli, and that the suspension of injected bacilli in liquid paraffin intensified the allergic state produced.—R. O. Muir.

Eichhorn, A., & Thaller, H. I. (1940). **Preparation of Brucella Antigen.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 55–66.

An investigation of the methods in use for the preparation of antigen for plate and tube testing for *Br. abortus* revealed the desirability of the central preparation of standard antigens used in Federal-state co-operative testing. The use of such antigen was unanimously accepted and it was estimated that 60 million c.c. of tube antigen and 360,000 c.c. of plate antigen would be required. A complete description is given of the arrangements and technique adopted to produce the antigens on a large scale. Each step is carefully checked and comparative sensitivity tests made. The tube antigen is issued in concentrated form in 20 c.c. vials to which is added 1,000 c.c. of carbol saline to bring the emulsion to the required density for use.—S. J. Gilbert.

Thaller, H. I. (1941). **A Survey of Field Results with Standardized Brucella Antigen.**—*Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* pp. 88–90.

During the period July 1939 to November 1940 the United States Bureau of Animal Industry has distributed 55,500,000 c.c. of *Br. abortus* tube antigen and 496,000 c.c. of plate antigen. In order to ensure a uniform standard for diagnostic purposes, 23,000 agglutination tests have been made. Comparative tests in conjunction with all laboratories using the antigen have indicated agreement of results in 96·6% of cases.—D. D. Ogilvie.

Stryszak, A., & Karnicki, E. (1939). Wystepowanie wyraznej aglutynacji bydła poleskiego nie zakażonego bruceloza. [**Complete Agglutination in Cows not Infected with Brucellosis**].—*Wiad. weteryn.* **18.** 254–260. [Abst. from French summary].

The authors stated that bovine brucellosis did not occur in Eastern Poland, and on the assumption that cattle in that area were uninfected they made observations on the aggln. reactions with *Br. abortus* of the sera of 105 cows. They compared the results obtained from these samples, with those from 1,000 sera of animals on infected farms.

At a serum dilution of 1 : 10, 40% of the cows gave a completely positive reaction (complete clearing of the liquid and the characteristic deposit), and a further 27% showed an incomplete reaction (a slightly cloudy liquid with characteristic deposit). At 1 : 20 dilution, there were 11% positive and 20% doubtful. At 1 : 40, there were 4% and 2% respectively, and at 1 : 80 there was 1% of doubtful reactions.

The authors argue that in territory free from infection a titre of 1 : 40, even when it occurs repeatedly, is not an indication of infection, whereas it is so in infected territory.

*Chiapponi, F. (1938). Ricerche comparative su alcuni metodi diagnostici sperimentali nelle infezioni brucellari degli animali. [**Methods of Diagnosis of Brucella Infections in Animals**].—*Ateno parmense.* **10.** 7–16. [Abst. from abst. in *Jber. Vet.-Med.* **63.** 575].

C. applied the complement-fixation, serum-agglutination, Diernhofer's rapid aggln., and the rapid "haemo-agglutination" tests to 65 clinically infected cows.

The c.-f. test gave 97% positive results, the slow aggln. test 92%, Diernhofer's test and the haemo-agglutination test both 91%.

C. concludes that the c.-f. test is the most reliable and that Diernhofer's test is very satisfactory.

Canič, R. (1939). Ueber die Verwendungsmöglichkeit der ABR.-Zentrifugierprobe bei der Untersuchung von Blutseren auf Abortus Bang. [**On the Possibility of Using the Ring Test in the Examination of Blood Sera for** *Brucella*

*abortus*].—*Berl. Münch. tierärztl. Wschr.* Oct. 27th. 646–647.

Fleischhauer [*V. B.* **10.** 851.] described a test for brucella agglutinins in milk in which the milk is mixed with a small quantity of stained *Br. abortus* suspension, the mixture centrifuged, and the test read by the presence or absence of a cup-like stained deposit at the bottom of the tube.

C. used the method as a test for blood agglutinins, the sera (213 in all) under test being added to known negative milk in the proportion of 1 : 2 and 1 : 5. He reports that the method gives results which generally run parallel with the ordinary tube method of testing. [The only possible advantage of the method over one of the ordinary direct methods appears to be that turbid or haemolysed sera can be tested.]—A. W. Stableforth.

Vellisto, E. (1939). Grenztiter der Normalagglutinine gegenüber Bang-Antigen. [**Normal Agglutinin Titers for** *Brucella abortus*].—*Eesti loomaarstl. Ring.* **15.** 10–19. [In German].

V. has tested sera from normal animals of various species with *Br. abortus* suspension, the agglutination titre being read after periods of incubation at 37°C. varying from 0–24 hours and standing for three days (? at room temperature) and being read again after a further period to allow for the slight increase of titre which may subsequently occur.

The sera tested comprised 42 from cows in abortion-free herds, 344 from cows which though in some cases in infected herds did not subsequently become positive, 14 from bulls, 18 from young cattle, 61 from swine, 26 from sheep, 22 from horses, 31 from g. pigs, and 60 from human beings.

Using the method outlined above the usual order of variation in and between species was found. The highest normal titres were found in horses up to 1 : 80, the lowest in calves and g. pigs, being 1 : 25 and 1 : 5 respectively. Cattle, sheep, and pigs gave titres up to 1 : 20, the mode being about 1 : 10 for these three species.—A. W. Stableforth.

Pagnini, U. (1938). Osservazioni e ricerche sperimentali sul valore diagnostico della sieroagglutinazione nell'infezione degli animali da Br. paramelitensis. [**Value of the Agglutination Test for** *Brucella* "*paramelitensis*" **Infection in Animals**]. —*G. Batt. Immun.* **21.** 281–307. [English, French and German summaries]. [Abst. in *Bull. Hyg., Lond.* **14.** 168–169, copied *verbatim.* Signed: G. S. Wilson].

The author tested the serum of 304 sheep, 148 rams, 68 goats, 75 cows, and 32 calves against one strain each of *Br. abortus*, *Br. melitensis*, and *Br. paramelitensis*. The sera were collected in the abattoir. A positive reaction at 1/100 or over was given by 18 sera against *abortus*, 19 sera against *melitensis*, and 184 sera against *paramelitensis*. A doubtful reaction at 1/25 or 1/50 was given against these three organisms respectively by 38, 38 and 149 sera. That is to say, *Br. abortus* and *Br. melitensis* behaved almost identically, reacting positively with about 3 per cent. of sera, while *Br. paramelitensis* behaved quite differently and reacted with about 29 per cent. of sera. Further observations rendered it practically certain that the agglutination of *Br. paramelitensis* in the serum of these animals was non-specific. A special investigation on 196 sheep from infected and non-infected herds showed that agglutinins for *Br. paramelitensis* were sometimes absent even when *Br. melitensis* could be demonstrated by culture, and that they were sometimes present even when the herd appeared to be completely free from *Brucella* infection. Experiments on inactivation of the serum by heating it to 56°C. for 30 minutes showed that the natural *paramelitensis* agglutinins found in the blood of many animals were relatively thermolabile, being often partly or completely destroyed by this degree of heat treatment, while *melitensis* and *abortus* agglutinins were thermostable. It was further observed that if *Br. paramelitensis* was injected into rabbits or goats the resulting specific agglutinins were thermostable, thus differing from the thermolabile agglutinins found in the blood of many apparently normal animals. For these reasons the author concludes that *Br. paramelitensis* is often agglutinated non-specifically, and that it cannot be relied upon for the diagnosis of Brucella infections.

Simon, J. (1939). Die Herzextraktagglutination. Eine neue Methode der postmortalen Feststellung der Pullorumkrankheit. [**Agglutination by Heart Extract. A New Method of P.M. Diagnosis of Pullorum Disease**].—*Arch. wiss. prakt. Tierheilk.* **74.** 298–315.

After a review and description of the technique of diagnosis of pullorum disease by the slow serum tube agglutination, rapid serum slide aggln., fresh whole-blood slide aggln., and dried blood filter-paper slide aggln. tests, S. discusses P.M. immunological diagnosis, which, if developed to a reliable degree, would be a great aid in diagnosing *Salmonella pullorum* infection in hens.

He investigated the value of the aggln. method, using heart extract instead of blood serum as antibody, on the lines introduced by Litzke (1934), who obtained results marred by the occurrence of pseudo-aggln. S. prepared his heart extract by snipping the heart into small fragments with scissors, adding a little normal saline, and filtering and centrifuging the mixture until a clear fluid was obtained. This was used in the ordinary tube and slide tests, being compared with the slow tube aggln. test of serum from the same fowls before death, with cultural diagnosis using liver and ovary, and with P.M. inspection.

It was found that the heart-extract test was almost completely reliable and was not subject to false results, except when antigen and extract were stale. Skeletal muscle extract was less reliable and is not recommended.

S. claims that the heart extract test is the best way of diagnosing *S. pullorum* infection in adult fowls. It was not effective in chicks, owing probably to the very slow formation of antibodies.—J. E.

Follensby, E. M., & Hooker, S. B. (1939). **The Effect of Temperature Upon Combination and Aggregation and Upon Equilibrium in the Reaction Between Antigen and Antibody.**—*J. Immunol.* **37.** 367–382. [Authors' summary copied *verbatim*].

A decrease in temperature from 40° to 5°C. has little influence upon the speed of combination between diphtheric toxin and antitoxin, but has a marked influence upon the $K_f$.

Temperature does not affect the equilibrium attained in optimal mixtures of diphtheric toxin and antitoxin.

With regard to temperature the reaction does not behave like one occurring in a single phase.

Precipitated anti-ovalbumin will combine with ovalbumin, and temperature has little if any effect upon the equilibrium attained in the mixture.

Diphtheric toxin and antitoxin will combine in the presence of an amount of salt insufficient for flocculation.

Boyd, W. C., & Hooker, S. B. (1939). **The Influence of the Molecular Weight of Antigen on the Proportion of Antibody to Antigen in Precipitation. II. A Statistical Examination of Available Data, Including some Previously Unpublished.**—*J. gen. Physiol.* **22.** 281–292.

The ratio of antibody to antigen in specific precipitates at or near the optimum, tends to decrease as the molecular weight of the antigen increases. Assuming that at the optimum point the antigen molecules are covered by a layer of antibody acting as contagious spherical units of molecular weight 35,200, ratios of antibody to antigen are predicted which agree well with those found experimentally.—R. A. Kekwick.

Dubos, R. J., & Hotchkiss, R. D. (1941). **The Production of Bactericidal Substances by Aerobic Sporulating Bacilli.**—*J. exp. Med.* **73.** 629–640. [Authors' summary copied *verbatim*].

Several species of aerobic sporulating bacilli recently isolated from soil, sewage, manure, and cheese, as well as authentic strains obtained from type culture collections, have been found to exhibit antagonistic activity against unrelated microorganisms.

Cultures of these aerobic sporulating bacilli yield an alcohol-soluble, water-insoluble fraction—tyrothricin—which is bactericidal for most Gram-positive and Gram-negative microbial species.

Two different crystalline products have been separated from tyrothricin. One, which may be called tyrocidine, is bactericidal *in vitro* for both Gram-positive and Gram-negative species; the other substance, gramicidin, is effective only against Gram-positive microorganisms. In general, tyrocidine behaves like a protoplasmic poison and like other antiseptics, loses much of its activity in the presence of animal tissues. Gramicidin on the contrary exerts a much more subtle physiological effect on the susceptible bacterial cells and, when applied locally at the site of the infection, retains *in vivo* a striking activity against Gram-positive microorganisms.

Webster, L. T. (1939). **Heredity in Infectious Disease.**—*J. Hered.* **30.** 365–370.

A concise review by one of the leaders in this field of research [see also *V. B.* **8.** 25]. The results of progeny tests are regarded as proof

that the differences in the response of individuals to a natural type of infection under conditions in which other variables are controlled are due to differences in their innate resistance. An investigation on the role of inborn resistance factors in epidemiology carried out by means of experimental studies on mouse typhoid is discussed and it is stated that, although inherited factors are of basic importance in determining the character of infection in both the individual and the herd, these can be modified by environmental factors. Among these factors so far tested the chief is diet, as epidemics may be started and terminated by merely altering the dietary factor, even though it may be maintained above the threshold of actual deficiency. The results of experiments on past factors, together with others referable to the infecting agent have led to a modification of the current theory of epidemics; this modified theory is stated.—R. ALLCROFT.

RICHARDSON, E. H., Jr. (1940). **Physical Allergy and "Auto-Antigens".**—*Proc. Soc. exp. Biol., N.Y.* **45.** 787–788.

Injection of heated or chilled serum, and subjection to heat or cold, failed to produce any signs of anaphylaxis in g. pigs. Thus no confirmation was obtained of KARADY's report [*V. B.* **11.** 176.] that g. pigs can be sensitized to heat or cold, *i.e.* that an organism's own protein may acquire antigenic properties for that organism by alteration due to physical agents such as heat or cold.—R. ALLCROFT.

STITZ, B. (1939). Gibt es eine Konkurrenz der Antigene? Ein Beitrag zur Frage der aktiven Immunisierung mit Mischimpfstoffen. [**"Concurrence" between Antigens. The Question of Multiple Immunization**].—*Zbl. Bakt. I.* (*Orig.*). **143.** 437–447.

S. has produced further evidence that the antigenic value of a vaccine is not in general interfered with by injecting it in combination with one or more other vaccines. Combinations of two or three of the following were tested in groups of five rabbits:—typhoid vaccine, Fraenkel toxoid, diphtheria toxoid, tetanus toxoid, and tetanus toxoid adsorbed on aluminium hydroxide, the antigenic potency being measured by agglutinin or antitoxin production.

Immunization with *Br. abortus* was apparently interfered with by coincident inoculation with dysentery or combined dysentery and typhoid vaccines. Otherwise no inhibitory effects were seen; in fact there was some evidence of synergistic effects.—A. W. S.

*ANDERSEN, T. (1938). Untersuchungen über die Blutgruppeneigenschaften der Schafe. [**Blood Groups of Sheep**].—*Z. Rassenphysiol.* **10.** 88–103. [Abst. from abst. in *Jber. Vet.-Med.* **64.** 295].

The sheep examined fell mostly into the groups Ao, Oα, and Oo. Variations occurred but could not be collected into significant groups. By immunization, sheep of the groups Ao and Oo could be caused to produce iso-antibodies against A, but these were not absorbable by human A blood cells. Thus immune iso-antibodies are unsuitable for the classification of sheep cells in the three-group scheme. The immunization of sheep against human A cells only produced antibodies against these cells and not against sheep A cells.

FELL, N., STERN, K. G., & COGHILL, R. D. (1940). **A Physical-Chemical Study of Normal and Immune Horse Sera.**—*J. Immunol.* **39.** 223–246.

The paper describes the results of investigations with the electrophoresis apparatus and ultracentrifuge on normal and immune horse sera and plasma, and products obtained following treatment with taka-diastase. Among the materials studied were diphtheria, tetanus, *Clostridium welchii*, and scarlet fever streptococcal antitoxic sera, antipneumococcus serum, and the products of enzyme treatment of these sera.

The electrophoretic mobilities and relative quantities of components present are reported, the enzyme-treated materials showing fewer components than the native sera. Significant increases were observed in the relative amounts of, and globulin in, the native antisera.

Attempts to fractionate the enzyme-treated antitoxin in the electrophoresis apparatus and ultracentrifuge resulted in no increase in purity. A high molecular size antibody was separable from antipneumococcus serum in the ultracentrifuge.—R. A. KEKWICK.

BATEMAN, J. B., CHAMBERS, L. A., & CALKINS, H. E. (1940). **The Mechanical Properties of Thin Films of Serologically Active Substances Prepared from Group A Hemolytic Streptococci.**—*J. Immunol.* **39.** 511–536.

The technique used in studying the surface spreading of proteins is discussed in considerable detail.

The behaviour of surface films of a type-specific antigen and of a nucleoprotein obtained from group A haemolytic streptococci is reported. The properties are similar to those which have been found for the "globular" proteins in general.—R. A. KEKWICK.

## DISEASES, GENERAL

JANSEN, J. (1939). Overzicht der onderzoekingen van het uit die praktijk ingezonden ziektemateriaal over 1938. [**Report of Diagnostic Work done in 1938 in the Parasitic and Infectious Diseases Institute at Utrecht University**].—*Tidjschr. Diergeneesk.* **66.** 1043–1054. [English, French and German summaries].

This contains a table showing the number of examinations, together with a commentary on some cases of particular interest, of which the most space is given to *Salmonella enteritidis* var. *dublin* infection in a herd of cows, and cow pox which was transmitted to a milker.

The original should be consulted for the many conditions reported.

—. (1941). **Report of Committee on Miscellaneous Transmissible Diseases.**—*Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* pp. 29–34. Discussion p. 34.

Equine infectious anaemia is still prevalent in all parts of the U.S.A. No specific treatment or vaccination has yet been discovered nor has a reliable laboratory diagnostic test been evolved. At present sanitary measures afford most hope of controlling the disease.

During 1940 less than 6,000 cases of equine encephalomyelitis were recorded. Continued search for host species acting as reservoirs of virus was made. Assassin bugs (*Triatoma sanguisuga*), caught wild, were found to harbour virus in Kansas. *Aëdes atropalpus*, *A. triseriatus*, and *A. vexans* were added to the list of *Aëdes* mosquitoes capable of transmitting the virus experimentally.

Anaplasmosis was diagnosed widely. The disease can be spread by carriers, by blood-sucking insects, or by mechanical transmission. Many animals are "effectively treated" with sodium cacodylate.

Tularaemia has now been found to exist in all parts of the U.S.A. A widespread epidemic in beaver in Montana is described. The findings indicate that water may be a medium of transmission and may be a possible source of human infection.—D. D. OGILVIE.

—. (1941). **Report of the Research Committee on Diseases of Young Calves [Royal Agricultural Society of England].**—*J. R. agric. Soc.* **101.** 78–79.

Reference is made to limited field trials with the alum-precipitated toxoid of *Corynebacterium pyogenes* as a preventive against natural attacks of calf pneumonia. This work has been carried out by the Research Institute in Animal Pathology of the Royal Veterinary College, with the help of veterinary practitioners and investigation officers. Collection of adequate statistics has been difficult, and it is apparent that determination of the efficacy of toxoid will be a long task. The investigators have, however, obtained indications that the toxoid may be of value in certain forms of sterility, and in other cases of disease due to or complicated by *C. pyogenes*, including "summer mastitis". Studies on calf diseases, such as "white scours", in which *Bacterium coli* is involved, have made some progress. The report states that even on well-managed farms there is an average calf mortality of at least 5%, whilst it may rise on some farms to above 10%. [See also LOVELL & HILL.—*V. B.* **11.** 538.]—N. J. SCORGIE.

JACKEMAN, H. W. (1940). **Diseases of Swine.**—*Canad. J. comp. Med.* **4.** 65–68 and 100–103.

A general discussion of some of the more common diseases of swine, including anaemia of young pigs, scours, haemorrhagic septicaemia, swine influenza, infectious enteritis, and erysipelas.—R. GWATKIN.

—. (1940). **Report of Committee of Transmissible Diseases of Swine.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 218–221.

Swine fever is still the most important transmissible disease of swine in the U.S.A. During 1939, however, no widespread epizootics occurred and local spread was well controlled

by serum-virus immunization.

The majority of midwestern states reported an increased incidence of enteric disease. Control was difficult.

Swine influenza was less prevalent than usual owing to the excellent weather which prevailed during autumn.

Swine erysipelas became widespread in four midwestern and three southern states.

Brucella infection of swine showed increased incidence in several midwestern states.

Although generally used in the southern states, the " McLean County System of Swine Sanitation " has not yet been widely adopted in the midwest.

More efficient inspection and supervision of pig sales in markets is advocated. Such sales are regarded as the chief factors in dissemination of disease at the present time.—D. D. OGILVIE.

SCHOOP. (1938). Aufzuchtschäden bei Füchsen im Jahre 1938. **[Breeding Diseases of Foxes in 1938].**—*Dtsch. Pelztierz.* **13.** 539–545.

This article, addressed primarily to fox breeders, discusses the causes of the losses experienced during 1938. Cryptorchidism was occasionally seen. Abortion was common; it is stated that although this is sometimes due to fright or sudden noises etc., the chief cause was unfavourable weather. Breeders had used rough, simple breeding huts of unsuitable type to avoid expense and there were considerable losses in new-born foxes. S. describes a suitable type of breeding box and outlines methods for converting existing accommodation, the most essential feature being an insulated double wall to provide an equable temperature. Roundworm and hookworm infestation were well under control. Lungworm disease is widespread and when farms are severely affected breeding becomes impossible. In one case lungworm-free foxes were put on land which had been vacant for a year, though formerly carrying lungworm-infested foxes. In a short time all the foxes had contracted the disease and losses in foxes 2–3 months old were heavy. S. recommends that when the disease appears the animals should be kept on wood or wire floors and that careful attention should be paid to diet.

The effect of heat-waves in lowering resistance to a variety of diseases is discussed.

—H. E. HARBOUR.

WEAVER, C. H. (1939). **Poultry Diseases and Poultry Industry.**—*Canad. J. comp. Med.* **3.** 73–76.

The poultry industry of Canada has not had the same protective laws and services that have been accorded the livestock industry. This, in conjunction with the rapid development of the industry, egg-laying contests, poultry shows, and the baby chick trade, has resulted in widespread dissemination of disease. Nutritional diseases have occurred extensively since the inception of intensive poultry husbandry. Egg-laying contests over a period of years show an annual mortality up to 35% and an average of 20% for a five-year period. Greater even than losses occasioned by deaths is lowering of egg production due to flock illness. Wastage of fowl flesh through disease must also be included. The burden of these losses probably falls both on the producer and consumer.—R. GWATKIN.

GLOVER, J. S. (1940). **The Role of the Veterinary Profession in the Control of Poultry Diseases.**—*Canad. J. comp. Med.* **4.** 260–268.

In 1938 the poultry industry of Canada was valued at $83,003,000, and it is pointed out that such an industry deserves more attention from the veterinarian than it generally receives. A table of specimens received during the year gives an idea of the conditions encountered in Ontario. Pullorum disease, coccidiosis, leucosis, TB., avian diphtheria, laryngotracheitis, chick bronchitis, fowl cholera, errors in diet and dietary deficiencies, worm infestation, aspergillosis, range paralysis, enteritis, and poisoning with various substances are discussed.

—R. GWATKIN.

—. (1939). **Report of the Committee on Transmissible Diseases of Poultry.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 193–197.

In pullorum-disease control it is considered that, with existing knowledge, control based on the serological testing of turkeys is inadvisable. The use of fowl typhoid bacterins in flocks being tested for pullorum infection may give rise to reactions in birds free from pullorum infection. In control of virus diseases the use of a live virus vaccine not indicated by the diagnosis may introduce a new disease hazard into the flock; in America live virus used as a vaccine has been used on occasion in a mistaken effort to control disease due to another cause.

The necessity of accurate diagnosis is emphasized. "Epidemic tremor" [*V. B.* **8.** 599.] is on the increase and becoming an economic factor. It is considered to be due to a filtrable virus and occurs in a paralytic, mixed clonic, and possibly a latent form. Fowl paralysis is now considered a subgroup of lymphomatosis (avian leucosis), which exhibits some features characteristic of malignant neoplasms. This group of diseases is the most important single factor in adult fowl mortality in the U.S.A. Wheat germ oil as a part of the diet has not proved of value in the control of fowl leucosis when tested by experimental methods. Equine encephalomyelitis has now been demonstrated in an extended list of susceptible birds which may constitute important natural reservoirs. Advances made in knowledge of nutritional disorders are reviewed briefly. Avian tuberculosis is widespread and it appears desirable to eradicate it from poultry flocks as part of the general TB. eradication campaign in farm animals. Mycosis (aspergillosis and moniliasis) appears to be increasing in some states. Duck septicaemia, due to *Pfeifferella anatipestifer*, has been a cause of a highly fatal disease of ducks in New York State and in Illinois.—J. A. GRIFFITHS.

—. (1940). **Report of Committee on Poultry Diseases.**—*J. Amer. vet. med. Ass.* **97.** 510–526.

The committee make comments on a number of prevalent poultry diseases and state the need for more veterinary practitioners to take an active interest in poultry practice.

An analysis of replies to a questionnaire which was sent to 750 veterinarians in the states of Illinois, Indiana, and Ohio is given. Replies were received from 28%. They show the small extent to which the practitioners are engaged in poultry disease work, and the great extent to which poultry disease treatment is in the hands of laymen. Courses of instruction in poultry diseases for veterinary practitioners are badly needed.

Fourteen recommendations are made concerning the constitution and work of the committee and the diseases which they consider require the most urgent research are named. The publication of the check list of poultry diseases, referred to in the previous report [*V. B.* **11.** 703.] is continued here with the list of bacterial diseases.—J. E.

I. —. (1941). **Discussion on Poultry Diseases.** [Speakers: CARPENTER, STAFSETH, JUNGHERR, MARTIN, BEAUDETTE, HINSHAW, BETHKE, & BRANDLY.]—*Proc. 44th ann. Meet. U.S. Live Stk sanit. Ass., 1940.* p.p. 137–178.

II. —. (1941). **Report of the Committee on Transmissible Diseases of Poultry.**—*Ibid.* 195–198.

I. A *verbatim* report is given of an informal discussion on poultry diseases including pullorum disease, infectious bronchitis, TB., "pullet disease", coccidiosis, laryngotracheitis, blackhead, fowl pox, infectious catarrhal enteritis, fowl paralysis, tapeworm infestation, and nutritional disorders. In each case practical applications of the latest results of research were considered. Special attention was paid to methods of control and eradication.

II. The Committee on Transmissible Diseases of Poultry recommends further research on coryza, fowl cholera, fowl typhoid, mycosis, infectious (chick) bronchitis, hexamitiasis, and trichomoniasis.

Severe losses which have occurred in turkeys in several states following infection with *Erysipelothrix rhusiopathiae* (bacillus of swine erysipelas) also require investigation.

Decisions are approved to arrange post-graduate classes in poultry diseases and to feature poultry subjects in all future state and district veterinary programmes.—D. D. O.

SEELEMANN, M., & PFEFFER, A. (1940). Ueber den Einfluss der Maul-und Klauenseuche auf den Verlauf der Abortus Bang-Infektion. **[Influence of Foot and Mouth Disease on the Course of Bovine Brucellosis].**—*Z. InfektKr. Haustiere.* **57.** 139–147.

In view of the impressions of certain veterinarians that an outbreak of F. & M. disease tends to be followed by an increased number of cases of abortion, retained placenta, sterility, and mastitis, the authors studied carefully the effects of F. & M. disease in seven brucella-infected herds which had been under their supervision for a few years, so that information about reactors and abortions was in the authors' possession.

Although the F. & M. disease outbreak in these herds took a severe course, and although serum therapy was not applied, no increase in the expected number of cases of abortion etc.

occurred, so that it was concluded that F. & M. disease has no aggravating effect on brucellosis, nor does it interfere with the acquirement of natural immunity against brucella infection.
—J. E.

Sykes, J. F., Duncan, C. W., & Huffman, C. F. (1941). **Blood Sugar and Carbon Dioxide Combining Power of the Plasma in Relation to Ketosis in Dairy Cattle.** —*J. Dairy Sci.* **24.** 193–197.

The urine of over 1,500 cattle was examined by the nitroprusside test for ketosis and 456 animals gave a strongly positive test, although with few exceptions clinical signs of ketosis were absent. Blood sugar, blood ketone, and plasma $CO_2$ estimations were carried out on these 456 animals. It was shown that decreased blood sugar values accompanied the ketosis, but the $CO_2$-combining power of the plasma showed no consistent variations, indicating that acidosis is not an invariable accompaniment of ketosis in dairy cattle.—F. A.

Smith, M. J., & Soderholm, L. C. (1938). **Acetonaemia of Dairy Cattle.**—*Canad. J. comp. Med.* **2.** 288–292.

The authors consider that this condition may occur at any time during lactation or pregnancy, more commonly in animals being fed highly fibrous hay low in carbohydrates and a grain mixture high in protein concentrates. The ratio of combustion of sugar and fat must be at least one part of sugar to one of fat. If it falls below this on the sugar side, acetonaemia results. Treatment consists of the administration of 500 c.c. of 50% dextrose solution with subsequent injection of 200 units of insulin. An alternative and perhaps more simple treatment consists of 6 drachm doses of chloral hydrate, each dose supported by a "teacup" of sugar. Percentage of recoveries is high.
—R. Gwatkin.

I. Eickmann, H. (1939). Pferde-Sterilitätsbekämpfung in der Rheinprovinz. [**Equine Sterility Control in the Rhine Province**].—*Dtsch. tierärztl. Wschr.* **47.** 404–407.

II. Goerttler, V., & Pröger, K. (1940). Die pflichtmässige Fortpflanzungsüberwachung bei Rindern in Thüringen im Jahre 1938. [**Obligatory Supervision of Cattle Breeding in Thuringia in 1938**]. —*Berl. Münch. tierärztl. Wschr.* March 1st. 97–101 and March 8th. 109–111.

III. Goerttler, V. (1940). Bemerkungen zu der Arbeit von Wille " Das pflichtmässige Sterilitätsbekämpfungsverfahren bei Rindern in Thüringen. [**Remarks on the Article by Wille**—*Tierärztl. Rdsch.* **45.** 857–860—**on the Obligatory Bovine Sterility Campaign in Thuringia**]. —*Ibid.* March 8th. 111–113.

I. A plan for the control of sterility in mares was put into operation in the Rhine Province in 1933 and was made compulsory in 1935. All breeding mares are examined with the exception of the following :– two- and three-year-old mares and those which had given birth during the year or that preceding to a live foal which had not suffered from joint-ill and was still living. The examination comprises taking a sample of the uterine washings, the mare's blood, and portions of the spleen and liver of the dead foal or foetus when available. This material is submitted for examination to the Animal Health Department. A service permit is given only if the result of the examination is satisfactory. Mares which fail to conceive after service during three consecutive oestral periods are submitted to a similar test.

During the first half of 1937, 8,991 mares were examined in this way. After being treated as required, for ovarian or uterine disease, they were either judged incurable or else released for service. In spite of the compulsory nature of the scheme, the fertility was only 36·5% and showed no significant rise above the figure for 1933 when only 300 animals were examined and the scheme was voluntary. The failure is particularly disappointing in view of the large scale of the scheme and the modern methods of treatment employed. An analysis of the results obtained is given in the form of tables.

II. The results of a compulsory scheme for the supervision of cattle breeding and the control of sterility which was introduced in 1935 were published in 1938 and 1939. The present paper gives further data, mainly in tabular form. Details of the organization adopted for carrying out the scheme are given. This includes the veterinary staff and, in each parish, a local farmer who is entrusted with the task of seeing that all cattle coming under the Order are brought for examination to the appointed centre. The following classes of cattle are examined :– cows which fail to conceive after service in two successive oestral

periods; recently calved cows; cows with disease of the genital tract, especially those with a discharge; all cows which have been brought into the area and have not calved there. Such cows are not allowed to be served until cured.

A rectal examination is carried out to determine pregnancy and to palpate the ovaries and Fallopian tubes. A vaginal exploration is made, including inspection and palpation of the os uteri. Uterine irrigation and examination of the washings is possible in only a small number of cases, owing to the large number of animals examined. Various methods of treatment were employed, mainly along conventional lines.

During 1938, the number of cows coming under the scheme was 347,129 and these came from 96,697 herds distributed in 2,497 parishes. Of these, 56,909 animals were examined (16·4%). The proportion of cows examined in different parishes varied widely according to the willingness of individual farmers to co-operate in the scheme. In some cases animals were sent for examination merely because the farmer hoped to find out whether the cow was pregnant.

Of the animals examined, 29,292, *i.e.* 51·47%, were classed as sterile; this represented 8·44% of the total number of cows under the scheme and varied in different parts of Thuringia from 4·94–14·57%. It is probable that the incidence of sterility as given by these figures is fairly reliable as farmers were usually keen to submit for examination any cows which failed to conceive.

It is of interest to note that the local practitioners failed to co-operate satisfactorily. The main reason for this was probably the smallness of the fee (3 marks) paid to the veterinarian by the farmer for each cow requiring treatment under the scheme. As a result some practitioners failed to carry out the examination and some owners, who considered the fee too high, failed to apply for the treatment. The veterinarian sometimes failed to persevere with the treatment at the proper times, apparently because of the need to pay special visits for this purpose. It is suggested that further measures should be taken to bring practitioners into the scheme in order to ensure its greater success.

Details of the scheme must be consulted in the original paper.

In general, it is concluded that the scheme is of great value in detecting and removing infertile cows and that the main need is for greater assistance from the veterinary practitioner in its effective working.

III. This is a reply to certain criticisms levelled by WILLE against the Thuringia bovine sterility campaign. These criticisms included the following:– that the incidence of sterility was insufficient to warrant a compulsory scheme and that such a scheme would soon fail to find support from farmers; that it should not be necessary to examine cows *per rectum* for pregnancy diagnosis as the farmer would be able to give information about the animal's history which would enable a diagnosis to be made; that the animals are sent for examination too late for effective treatment to be given; that the response of the private practitioner to the scheme is wholly inadequate, and that the work might be better carried out by state veterinarians. G. gives a satisfactory answer to most of these criticisms and shows that the annual number of calvings has risen since the introduction of the scheme in Thuringia from 68·0–73·8%, *i.e.* a total of 10,875 more calves annually. These figures seem the most effective reply to criticisms of the scheme, which none the less has its defects.—E. G. W.

HOFFMAN, H. A. (1939). **A Highly Fatal Disease of Horses.**—*Bull. Calif. Dep. Agric.* **28.** 284–287.

The disease described occurred during the last quarter of 1938 in Yolo county, California, and was fatal in ten out of 12 cases, all being ranch horses mostly over eight years old. The affected horses showed rapid weakness, haemoglobinuria, and intense icterus; death in coma took place within about 12 hours. At P.M. examination it was seen that:–

"All the tissues throughout the body were intensely icteric. The heart muscles were cloudy, the serous surface was tinged green and there were extensive diffuse hemorrhages beneath the endocardium. The lungs were deep yellow, dry and collapsed readily. The mediastinal lymph glands were calcified. The liver was dark green with stringy fibrous material attached to the surface. The liver substance was cloudy in appearance. A large mass of fibrous material was suspended from the abdominal surface of the diaphragm. These shreds were six to eight inches long with yellow pus-like pockets at the tips. The kidneys were swollen and green in color. The surface was covered with edematous, hemorrhagic masses outside the capsule. Free pus was observed in the renal pelvis. The intestinal tract was deep yellow; the contents dry, without evidence of serious impaction. Submucous hemorrhages were found. The stomach contained a large mass of food material. The mucuous mem-

brane was hemorrhagic with free blood on the mucous surface."

Attempts to isolate a causal bacterial organism and to incriminate equine encephalomyelitis (by animal inoculation) gave negative results. Inclusion bodies were found in the nerve cells of the hippocampus of one case, but they were not Negri bodies.—J. E.

CRAIG, J. F., & DAVIES, G. O. (1941). **Periarteritis Nodosa in Cattle.**—*Vet. J.* **97.** 99–101.

The authors give a brief review of periarteritis nodosa as applied to animals, the condition having been described in other countries in cattle, pigs, a dog, and an antelope. Although no previous record of the condition in Great Britain could be found, the authors had encountered it in three Irish cattle, and they now describe a recent case in a two-year-old heifer.

Lesions were seen in the general musculature, myocardium, subepicardial fat, and mammary gland. (Previous cases had lesions in the spleen, kidneys, liver, lungs, musculature, tongue, and diaphragm). The aorta and large vessels were normal. Small and medium sized vessels were involved and, when sectioned, showed as small grey areas varying from the size of a pin head to that of a barley grain. The vessels were more tortuous than normal and the length of the vessels (rather than isolated nodules) was thickened. In some cases the lumen had been obliterated and the lesions (illustrated) greatly resembled those seen in gummata of human syphilis. No precise cause of the condition was found. In some muscles there was a light infestation with sarcosporidia without any relationship to the diseased blood vessels. Some muscle fibres showed hyaline degeneration, probably related to interference with the blood supply. The presence of brown granules of haemosiderin in the affected areas and of eosinophile corpuscles suggested that helminth parasites may have set up the primary changes in the vessel walls and that the lesions found might be regarded as attempts at repair.
—C. V. WATKINS.

*AUGUST, H. M. (1938). Klinische Beobachtungen und Heilversuche bei dem letzten gehäuften Auftreten der sogenannten Stuttgarter Hundeseuche in München im Jahre 1936–37. [**Experiences with Stuttgart Disease at Munich in 1936 and 1937**].—*Inaug. Diss., Munich.* [Abst. from abst. in *Jber. Vet.-Med.* **65.** 381].

A clinical description of an outbreak of Stuttgart disease which occurred in Munich between August, 1936 and February, 1937. The disease was not accompanied by icterus and it caused a mortality of over 80%. In no case was it possible to find leptospira in the urine. No histological or serological investigations were made.

SHOLL, L. B., LANGHAM, R. F., & THORP, W. T. S. (1941). **Some Observations on Canine Nephritis.**—*J. Amer. vet. med. Ass.* **98.** 295–301.

Of 16 animals in which nephritis was diagnosed by blood and urine examinations, ten were examined P.M. Symptoms varied, anorexia, weakness, loss of weight, and vomiting being the most prominent. An increase of creatinine in the blood accompanied by high values for non-protein nitrogen and urea was considered diagnostic, as was also the presence of albumin, casts, and cells in the urine. The macroscopic and microscopic appearances of the kidneys are described. In most respects the lesions were similar. The disease usually began in the interstitial connective tissue of the cortex. Tubular atrophy and necrosis occurred followed by alterations in Bowman's capsule and in the glomeruli. The medulla also showed numerous lesions. It is supposed that some toxin or bacteria initiated the lesions in the cortex, reduced the capillary circulation, and led to tubular atrophy and necrosis.—R. F.

HART, L. (1940). **Sinusitis in Turkeys.**—*Aust. vet. J.* **16.** 163–168.

A disease which appears to be specific for turkeys and is characterized by inflammation of the infra-orbital sinuses is described.

The causal agent was not determined, but appears most likely to be a filtrable virus, although two attempts to pass it through an Elford collodion membrane were unsuccessful. It persisted *in vivo* for 11 months, the maximum period tested.

Although in the field it behaves as a highly infectious disease, it has been possible to transmit it experimentally only by direct injection of exudate into the sinuses. The disease was set up by injection into each sinus of 1·0 ml. of a 1 : 10,000 dilution of exudate. Attempts at infection by contact, ocular and nasal instillation, and atomization gave negative

results. The time elapsing between injection and the appearance of symptoms varied from 3–12 days. Sinus content produced the disease after being held in glycerin saline for 14 days at 36°C., but not after being held for two months. After being held in saline alone at 36°C. for 14 days, it failed to produce the disease.

Birds recovered from one attack were immune to reinfection, but attempts to confer artificial immunity were unsuccessful.

The best and cheapest method of treatment appears to be injection into affected sinuses of small amounts of 2–5% silver nitrate solution. This must be carried out in the early stages and care taken that the solution does not enter the subcutaneous tissues.—H. B. CARTER.

GALLI-VALERIO, B. (1939). Observation sur les verrues et papillomes (*verrucae vulgares*). [**Notes on Papillomas**].—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 91–94. Osaka: Osaka Natural History Society. [In French]. [Abst. from author's summary].

The author considers that papillomas of man and of animals, especially cattle and birds, are probably caused by a single virus. This virus passes a Berkefeld candle [grade not given], and is probably represented by fine particles, stained violet by Giemsa's stain, occurring in the filtrate. Transmission occurs through direct contact with the lesions or with infected objects, or perhaps through flies contaminated by settling on ulcerated papillomas. Penetration takes place through skin lesions caused by wounds, by mange mites, or by friction. Papillomas in the ears of a rat and of a mangy cat were typical in this respect, as were those on the claws of birds, described in this article.

GAVRILOV, W. (1939). De l'influence sur les nerfs périphériques des injections sous-cutanées de virus. (Virus du myxome contagieux du lapin et virus de Shope). [**The Influence on Peripheral Nerves of Hypodermic Injections of the Rabbit Myxoma and Fibroma Viruses**].—*Bull. Ass. franç. Cancer.* **28.** 892–907.

The subcutaneous connective tissue of the rabbit shows three main networks of myelinated nerve fibres; one lies immediately beneath the epidermis, one next to the muscles, and a third along the blood-vessels. Non-myelinated fibres emerging from these networks terminate in the connective tissue, the muscles, and the epidermis. G. studied the changes produced in these nerves by subcutaneous injection of various "tumour-producing" viruses.

He injected an [unspecified] amount of a strain of the infectious myxomatosis virus (Sanarelli) subcutaneously into the shaved back of a rabbit. On the second day after injection, the skin locally was hot and oedematous; the rabbit was moribund on the 13th day, and was destroyed on the 14th day. Examination of material removed by biopsy from the site of injection showed that, by the 13th day, the necrosis and inflammation occurring locally had destroyed the myelinated and non-myelinated nerves; some evidence was found that nerve fibres, along with connective tissue elements, had begun invading the area from its periphery on the 13th day.

A domestic rabbit died on the tenth day following subcutaneous and intradermal injection of the inflammatory type of fibroma virus, after having shown a local area of inflammation and necrosis, around which was a commencing accumulation of cells typical of this condition. On the other hand a wild rabbit, injected with the same strain of virus, showed the formation of walnut-sized subcutaneous nodules, which on microscopic examination were seen to be fibromatous; only a small non-persistent area of inflammation was found; the fibromas disappeared spontaneously after about two months, and the rabbit was apparently normal after three months. Material removed at biopsy from both these rabbits showed only a moderate destruction of nerve fibres, and the nerve networks were completely restored in the rabbit that survived.

In a wild rabbit, subcutaneous injection of a strain of fibroma virus gave rise to a very slight local inflammatory reaction; in a domestic rabbit, similar injection gave rise to large confluent plaques, which disappeared after about three weeks, the rabbit meanwhile remaining in good health. In both these cases, the changes seen in the nerves were chiefly atrophy and degeneration, as a result of the pressure of the developing tumour, and of the inflammatory and necrotic changes in the tissues. In some areas remote from these influences, however, degenerative changes were detected in the nerves; G. suggests that these might indicate a direct action of the virus on the nerve fibres. With regression of the

tumour, the nerve networks were restored, partly by regeneration of nerves *in situ*, and partly by invasion by nerve elements from nearby healthy zones.

G. concludes from his observations that the degenerative changes in the nerves in all these instances might be attributed to the tissue reactions to the viruses, and only in the case of the fibroma does he postulate direct action of virus on nerves.—E. COTCHIN.

GREENE, H. S. N. (1939–40). **Familial Mammary Tumors in the Rabbit. I. Clinical History. II. Gross and Microscopic Pathology. III. Factors Concerned in their Genesis and Development. IV. The Evolution of Autonomy in the Course of Tumor Development as Indicated by Transplantation Experiments.**—*J. exp. Med.* **70.** 147–158, 159–166 and 167–184; **71.** 305–324.

I. Spontaneous tumours of the breast are known to occur in some species of animals, notably the mouse and dog, but very few cases have been reported in the rabbit. G. has observed two distinct types of familial mammary cancer in rabbits. In the first type (19 cases), sudden and intense engorgement of the entire mammary gland was followed by stages of cyst formation and benign neoplasia before the cancerous stage was finally reached. In the second type (four cases) the cancers usually arose in one gland and were not preceded by any local abnormality.

The tumours all arose in two lines of rabbits (Belgian Hares and English rabbits) and their crosses which had been specially bred to encourage probable tumour animals.

II. G. considers it unwise to apply to rabbit tumours the usual criteria of malignancy as applied to tumours in human beings. The rabbit growths were classed as cancers only if the neoplastic cells had invaded and appeared to have proliferated in foreign locations. The first type of tumour arose as papillomas from the epithelial lining of the acinar and duct walls. After continued growth these formed multiple radicles which anastomosed to form numerous acinus-like structures. The growths of this type were classified as anastomosing papillomas in order to distinguish them from tumours of the second type which originated in normal breasts and which arose from a proliferation of the true acini and could be more accurately classified as adenomas.

III. An analysis of the pedigrees shows that although there cannot be any doubt concerning the action of hereditary factors in the production of these tumours, the available evidence as to the mechanism of inheritance is doubtful. The tendency to tumour formation is genetically recessive as a rule but occasionally appears to be dominant. Numerous animals of unrelated lines have been fostered by tumour-bearing animals and held under lengthy observation, but no tumours have developed. All the rabbits in which cystic disease progressed to neoplasia were in a genetically related group. Outside this family line cystic disease was not progressive, but it must be recognized that cystic disease is an essential precursor to one form of neoplasia in the rabbit. Six of the rabbits bearing mammary tumours also had coincidental uterine growths, whilst there was a marked progressive disturbance of the reproductive organs generally. In addition the pituitary and adrenal glands showed consistent and unusual alterations. It is known that some 50% of rabbits with uterine adenomas show mammary changes together with endocrine disturbance.

G. considers that these associations may indicate that uterine and mammary tumours have a common hormonal origin, *viz*, oestrone which is known to produce similar neoplastic changes experimentally, whilst the preponderance of breast growths in some genetic lines and of uterine growths in others suggests the operation of accessory hereditary location factors. It is inferred that the spontaneous growths represent a natural counterpart of the experimental induction of neoplasia with oestrone.

IV. This paper deals mainly with transplantation experiments with one tumour of the papillary type and one tumour of the acinar type.

In the case of the papillary tumour, the primary growth could not be transplanted on another rabbit until the tumour cells had invaded distant and foreign tissues. The most satisfactory site for transplantation was the anterior chamber of the eye. Attempts to transfer fragments from the anterior chamber "takes" to other sites on other animals have not been very successful, but a few "takes" have been obtained in the testicle and subcutaneous tissues. Similar results have been obtained with the acinar type tumour. Attempts

to transplant the tumour intramuscularly and into the subcutaneous tissue have been unsuccessful. Testicular transfer has given rise to one " take " in a series of 50 animals inoculated with eye transplants.

The tumours have been successfully carried by serial transfer through a number of generations. The most outstanding feature in the transplantation of the papillary type tumour was the marked susceptibility of males as against females. The acinar type of growth was distinguished by its high transplantability in the anterior chamber of the eye, and its extremely rapid growth with early retrogression.

—J. S. PATERSON.

MORELLI, E. (1939). Ricerche preliminari sopra la specificità sierologica dei tumori aviari. **[Serological Specificity of Avian Tumours]**.—*Biochim. Terap. sper.* **26.** 67–77. [English, French and German summaries]. [Abst. from English summary].

Rabbits injected with fowl sarcoma globulin fraction produced antibodies for the fowl serum fraction but not for the sarcoma. When one alcoholic extract of the sarcoma from a pheasant was used, antibodies were produced for the pheasant serum and for Forssmann's antigen and none for the specific tumour.

Forssmann's antigen is known to exist in the tissues of many animals and may account for apparent serological reactions between different kinds of tumours.

STUBBS, E. L. (1939). **Fowl Leukosis.**—*Proc. 7th World's Poult. Congr., 1939.* pp. 295–298. Washington, D.C.: U.S. Dep. Agric.

S. discussed the literature on the subject of the avian tumour-producing viruses. He proposed that the term " leucosis " should include leucaemias and leucaemia-like conditions in fowls. He described the nature and characteristics of a number of strains which cause leucosis. Some strains are transmissible, a fact which facilitates their study, and have been described, whereas others are not transmissible with certainty and are not understood. Some strains are apparently pure and produce the same result at all times. Others are complex with apparently several disease-producing qualities.—S. G. IYER.

ROCHA E SILVA, M., & BIER, O. (1939). Estudos sobre inflamação. IV—Experiencias com exsudatos inflamatorios pobres em histamina. **[Studies on Inflammation. IV. Experiences with Inflammatory Exudates with Low Histamine Content]**.—*Arq. Inst. biol., S. Paulo.* **10.** 219–234. [English summary].

The authors carried out experiments with inflammatory exudates with a histamine content of less than 1 : 1,000,000. These exudates were injected into the skin of rabbits and the reaction demonstrated by the trypanblue test. Similar tests were performed on g. pig lung. The reactions produced by the intradermal injection of irritating substances such as turpentine, pyridine, and amyl and butyl alcohols were also demonstrated by the trypanblue test. The similarity of the reactions suggests that both histamine and irritating substances provoke an intense outpouring of histamine from the skin. The authors question the exactitude of Menkin's " leucotaxine " theory [see *V. B.* **11.** 45.] because of the non-specificity of the trypanblue test by which he controlled his work.

The possibility that histamine, liberated in the body by tissues such as the skin, is later destroyed by histaminase is being studied.

—MILLER WATSON.

MENKIN, V. (1940). **Studies on Inflammation. XVIII. On the Mechanism of Leukocytosis with Inflammation.**—*Amer. J. Path.* **16.** 13–32. [Author's conclusions copied *verbatim*]. [For previous parts, see *V. B.* **11.** 45].

Leukotaxine, a crystalline nitrogenous substance recovered from inflammatory exudates, and known to increase capillary permeability and cause diapedesis of polymorphonuclear leukocytes, fails to induce an increase in the leukocytic level of the circulation in either the dog or the rabbit. Hence it can scarcely be responsible for the leukocytosis of inflammation.

There is present in exudates a leukocytosis-promoting factor capable of inducing a rise in the leukocyte level of dogs. This is demonstrable when either the whole or the cell-free exudate is introduced into the circulating blood.

An inflammatory exudate removed from an animal with leukopenia and injected into a normal dog fails, as a rule, to induce a marked rise in the leukocyte count.

Blood serum, sterile broth, bacterial cultures of exudates and cultures of killed bacteria

(*Staphylococcus aureus*) are all ineffective in causing an increase in the leukocyte level of the circulation.

Histamine and adenosine are likewise essentially inactive. Extraction of exudates containing the active leukocytosis-promoting factor for histamine, yields an end-product incapable of inducing leukocytosis. Nucleic acid injected into the blood stream in large concentration favors, after a considerable latent period, a rise in the number of leukocytes. This delayed effect differs from the prompt response induced by exudates.

The action of the leukocytosis-promoting factor seems to be primarily on the bone marrow, producing an outpouring of immature granulocytes into the circulation. The factor is thermolabile. Heating the exudate to 60°C. inactivates the material. The factor, after prolonged dialysis of the exudate through a cellophane membrane, is found to be, in large part, indiffusible. Further studies are now in progress in an endeavour to identify the nature of the leukocytosis-promoting factor present in inflammatory exudates.

REGGIANINI, O. (1939). Comportamento all'emolisi fotodinamica da clorofilia dei globuli rossi degli erbivori, dei carnivori, degli onnivori ad alimentazione con o senza clorofilia. [**Photodynamic Haemolysis of the Blood of Herbivora, Carnivora and Omnivora on a Diet Containing Chlorophyll**].—*Biochim. Terap. sper.* **26.** 365–379. [English, French and German summaries]. [English summary amended].

R. has demonstrated that the chlorophyll photodynamic haemolysis is not comparable to that caused by other photodynamic substances.

The degree of photodynamic haemolysis varies between species and within a species, and also according to the nature of the food supply.

The blood corpuscles of the carnivora are more resistant to chlorophyll photodynamic haemolysis than are those of the herbivora.

## NUTRITION IN RELATION TO DISEASE

MCINTOSH, R. A. (1938). **The Significance of Faulty Nutrition in Disease.**—*Canad. J. comp. Med.* **2.** 271–281.

A general discussion of the subject dealing with the constituents of plant and animal tissues, the vitamins, and a consideration of nutritional disturbances. Ca, P, Fe, and $I_2$ deficiencies are dealt with and also avitaminoses. The sources of these factors are considered and formulae for supplementary feeding are given.
—R. GWATKIN.

MCHENRY, E. W. (1938). **The Nutritional Value of Raw and Pasteurized Milk.**—*Canad. publ. Hlth J.* **29.** 295–297.

A brief review of literature on raw and pasteurized milk. No harmful changes result from pasteurization. Vitamin C content is lessened, but since raw milk must be supplemented with this vitamin this is not of practical importance. Because of its high nutritive value milk is a food of primary importance, and consumption studies indicate that its use should be increased in Canada provided that it is pasteurized. This process does not lessen the nutritive value, as those constituents which are particularly useful in nutrition are not affected by heating.—R. GWATKIN.

MAGNUSSON, H. (1940). Om käknekroser hos kycklingar orsakade av olämpligt foder. [**Necrosis of the Beak of Fowls due to Unsuitable Food**].—*Svensk VetTidskr.* **45.** 170–173.

A description of two instances of young fowls in separately owned flocks sustaining injury to their beaks and mouths from the effect of being fed on finely ground cereal meal, which caked into hard masses which became impacted in the mouth, resulting in necrosis of the mucous membrane, the beak, and beak bones. In advanced cases the beaks became seriously deformed.

A warning is given to poultrymen not to give fine meal to chickens and to provide a water supply.—J. E.

ASPLIN, F. D. (1940). **A Disease of Chickens Apparently Identical with Nutritional Encephalomalacia.**—*Vet. J.* **96.** 449–452.

The occurrence of a severe nervous disease in young chickens is described. The characteristic symptoms were ataxia coupled with vigorous attempts to maintain balance and progressive movement until prostration and death ensued. The disease occurred in three

separate groups of chickens 3–5 weeks old, but the incidence was low, only six birds being affected out of a total of 112. The groups were on different diets and there was no contact between them. No further details of the management and feeding of the chicks are given.

P.M. examination revealed oedema, haemorrhages, and necrosis in the cerebellum. Bacteriological examinations gave negative results; transmissibility tests were not made. The microscopic lesions in the brain are described and it is considered that the disease was probably identical with experimental nutritional encephalomalacia.—W. R. MUIR.

SCHOFIELD, F. W., & JONES, T. L. (1939). **Prevention of Anaemia in Suckling Pigs. A Simple and Economical Treatment.**—*Canad. J. comp. Med.* **3.** 63–66.

The authors concluded from their experiments that the most practical method for the prevention of anaemia in piglets is by the use of reduced iron. A single dose of 300 mg. given *per os* when the pigs are 6–8 days old will ensure adequate protection against anaemia. Reduced Fe may be given in this dosage without any evidence of harmful effect. The practice of placing sods in the pens or creeps for the piglets is commended as a valuable prophylactic. The addition of Cu produced no beneficial effects. A single dose of 4 c.c. of a saturated solution of sulphate of iron gave good results, but the time taken to administer such a dose was found to render its use impracticable. Fe was given from the 5th–8th day.

—R. GWATKIN.

MITCHELL, C. A. (1940). **Anaemia with Special Reference to Iron Deficiency in the Young Animal.**—*Canad. J. comp. Med.* **4.** 93–99.

Deals with development of the red blood cells, the formation and properties of haemoglobin, factors which stimulate the production of r.b.c., classification of anaemias, metabolism of iron, anaemia in the young, and prevention and treatment of iron deficiency. It is pointed out that the treatment of such animals must be guided by facts which bear on the absorption and utilization of Fe. A seriously affected animal may have a reduced HCl output in the stomach and ferrum redactum given to such animals must be converted to ferrous chloride before it can be absorbed.—R. GWATKIN.

BENNETTS, H. W. (1940). **Coast Disease in Western Australia.**—*J. Dep. Agric. West. Aust.* **17.** 41–48.

It has been demonstrated by experiment that "coast disease" of sheep in Western Australia is identical with that investigated in South Australia where it was found to be due to a dual deficiency of Cu and Co. With regard to "coast disease" in cattle, although not yet experimentally proved, there is no reasonable doubt that the cause is identical with that in sheep; the usual symptoms are very similar. Observations indicate that Co and Cu supplements are beneficial to cattle pastured for even relatively short periods on "coasty country". Moreover, as is well known in Western Australia, cattle are susceptible to single deficiencies in Co ("Denmark wasting disease") and in Cu.

The use of Cu and Co supplements as licks or drenches is recommended for the control of "coast disease" among sheep and cattle in Western Australia.—H. B. CARTER.

BOWSTEAD, J. E., & SACKVILLE, J. P. (1939). **Studies with a Deficient Ration for Sheep. I. Effect of Various Supplements. II. Effect of a Cobalt Supplement.**—*Canad. J. Res.* Sect. D. **17.** 15–28.

I. Sheep became unthrifty over a period of seven months on non-leguminous hays and ground oats. Pasture, Ca and P, cod liver oil, tankage, linseed meal, bran, and alfalfa meal delayed the appearance of unthriftiness. Fe and Cu proved detrimental and wheat germ did not help. Alfalfa ash was the best supplement, indicating that the deficiency in the non-leguminous ration was one or more of the minerals in the alfalfa hay.

II. Cobalt given as a supplement to unthrifty ewes resulted in a rapid increase in weight and thriftiness. Chemical analyses showed only small amounts of Co in non-leguminous hays compared to alfalfa grown on similar soil. Alfalfa in certain districts contained only small amounts of Co. It is suggested that a Co problem may exist in western Canada.—R. GWATKIN.

WOOD, S. N. (1940). **The Newer Knowledge of Iodine in Nutrition and Therapy of Livestock.**—*Canad. J. comp. Med.* **4.** 306–315.

A review of modern work in connexion with experimental feeding of iodine. It is pointed

out that, in many of the research studies, in only a few cases was the $I_2$ content of the basic natural feed ration determined or was it proved that any $I_2$ deficiency was present; also in most instances only short-term trials were made. The recent work indicates a need for further careful study of the entire field of feed supplements before farmers in general are advised to feed $I_2$ in any supplementary manner, no matter how small the amount, except in areas where there is a known deficiency.—R. GWATKIN.

I. BATT, F. (1940). Struma hos storfe. [**Goitre in Cattle**].—*Norsk VetTidsskr.* **52.** 89–98.

II. MOHOLDT, A. (1940). Tang som hjelpefor—foringsforsøk med tangmel til hester. [**Seaweed as a Supplementary Foodstuff. Experiments with Seaweed Meal on Horses**].—*Ibid.* 38–61. [English and German summaries].

I. By meat-inspection examinations at Oslo abattoir, B. found that 4% of 50 cattle from the Aker, and 16% of 50 cattle from the Modum districts [north-west of Oslo] were affected with goitre. The plant food of animals and man in the interior of Norway contains scarcely sufficient iodine for health, and B. proposes the large-scale use of seaweed as a vehicle for bringing to the land a greater amount of iodine.

II. This paper describes various species of seaweed and their use in feeding experiments on army horses, the object being to use seaweed meal as a partial substitute for energy foods such as oats. The results reported were favourable but of a preliminary nature. The seaweed meal had an anthelmintic effect against ascaris and sclerostomes.—J. E.

WILKINSON, B. M., & MCCANCE, R. A. (1940). **The Secretion of Urine in Rabbits During Experimental Salt Deficiency.**—*Quart. J. exp. Physiol.* **30.** 249–261.

Experimental salt deficiency in rabbits was induced either by the oral administration of diuretin or by a technique involving the intraperitoneal injection of 5% glucose and the withdrawal of as much of the fluid as possible by paracentesis performed three hours afterwards. In such animals (as in human cases of salt deficiency) a marked uraemia developed, and a study was made of the probable causes. The rabbits were shown to be in negative nitrogen balance, and to be unable to excrete water normally either at normal fluid intakes or when test doses were forcibly administered. No correlation could be obtained between fall in blood-pressure, rise in haemoglobin and the rise in blood urea, and it is suggested that the reduction in the rate of glomerular filtration which occurred at all urine flows was due to some change within the kidney itself.—A. N. W.

DOLS, M. J. L., JANSEN, B. C. P., SIZOO, G. J., & VAN DER MAAS, G. J. (1939). **Studies on Phosphorus Metabolism in Normal and Rachitic Chickens with a Radioactive Phosphorus Isotope. III. The Distribution of the Injected Phosphorus in the Organs, Especially in the Different Parts of the Leg Bones.**—*Proc. Kon. Akad. Wet. Amsterdam.* **42.** 499–505. [In English]. [See also *V. B.* **10.** 863].

Groups of normal and rachitic chickens were injected intraperitoneally with "labelled" P in the form of radioactive sodium phosphate. After 22 hours the birds were decapitated and the leg bones were dissected out and cleaned. The epiphyses and diaphyses were separated and analysed. It was found that in both normal and rachitic birds P metabolism was more intensive in the epiphyses than in the diaphyses of the bones; also P metabolism was more intense in the bones of rachitic than of normal birds. Quantities of radioactive P were located in the livers, but there were no significant differences in amounts between normal and rachitic chickens.

An interesting confirmation of these findings was obtained by placing normal and rachitic leg bones on double-coated X-ray films and leaving them for some days according to the quantity of radioactive P injected. After the films were developed the epiphyses showed up more intensely than the diaphyses, in relation to their content of the active P. This method of "auto-radiographs", it is suggested, offers potentialities in studying the distribution of P in the bones of animals.—ALFRED EDEN.

SCHOCH, W. (1938). Ueber die experimentelle Rachitis beim Schwein. [**Experimental Rickets in the Pig**].—*Mitt. Lebensm. Hyg., Bern.* **29.** 176–185. Discussion p. 186. [Abst. in *Nutr. Abstr. Rev.* **8.** 1148, copied *verbatim*. Signed: C. CROWTHER].

An account is given of an unsuccessful attempt to produce rickets in pigs by feeding rations with wide Ca : P ratios. The explana-

tion apparently lay in the relatively high absolute amounts of the two elements in the food.

SMITH, M. C., & SPECTOR, H. (1940). **Some Effects on Animal Nutrition of the Ingestion of Mineral Oil.**—*Tech. Bull. Ariz. agric. Exp. Sta.* No. 84. pp. 373–395.

The continuous ingestion of mineral oil is shown to interfere seriously with the utilization of vitamins A and D in rats and dogs and adversely to affect nutrition and health. The mineral oil was incorporated in the experimental diets at levels of 5 and 10%. Admixture of mineral oil and food was adopted as the simpler procedure, since preliminary experiments revealed no difference in response to a given quantity of mineral oil when mixed with the food or when administered as a separate dose.

The liver reserves of vitamin A in rats and dogs receiving mineral oil were considerably less than those of control animals and were sometimes reduced to nil. The reproductive performance of females was markedly affected, fertility periods, numbers of litters, and capacity of young to survive to the weaning stage all being reduced.

Interference with the utilization of vitamin D was demonstrated by the development of rickets and a lowered retention of Ca and P in puppies receiving mineral oil with a diet containing adequate amounts of Ca and P and the minimum curative dose of cod liver oil. A three- to ten-fold increase in the normal curative dose of cod liver oil was necessary to cure rachitic rats continuously ingesting mineral oil.—W. R. MUIR.

I. SMITH, M. C., & SPECTOR, H. (1940). **Calcium and Phosphorus Metabolism in Rats and Dogs as Influenced by the Ingestion of Mineral Oil.**—*J. Nutrit.* **20.** 19–30.

II. SMITH, M. C., & SPECTOR, H. (1940). **Further Evidence of the Mode of Action of Vitamin D.**—*Ibid.* 197–202.

I. The effect of continuous ingestion of a liquid paraffin of high viscosity on the Ca and P metabolism of rats was studied by comparing the degree of calcification of rachitic lesions (as shown by the " line test ") brought about by various levels of vitamin D fed as cod liver oil, in the presence and absence of mineral oil. In dogs, the retention of Ca and P was estimated by means of a series of 11 weekly balance studies; four young dogs were used and received a diet adequate in Ca, P, and vitamin D, except one dog which served as a negative control.

In rats three times as much cod liver oil was necessary to induce healing of rachitic lesions when the basal ration contained 5% mineral oil, and 5–10 times as much was needed when 10% mineral oil was given. In the dogs, severe rickets occurred showing that ingestion of mineral oil interfered with the retention of both Ca and P. An increase of five times the amount of cod liver oil did not provide optimal retention of Ca and P in the dog receiving the ration containing 10% mineral oil.

These results show that ingestion of mineral oil interferes with the utilization of vitamin D.

II. Further experiments were carried out on rats to study the interference of mineral oil on the absorption of vitamin D. Vitamin D was supplied by external irradiation of the rat and not by oral administration of cod liver oil as in I. The rats were maintained on a rickets-producing ration with and without incorporated mineral oil, and the healing effect of ultra-violet irradiation was studied on both groups. The results showed that ingestion of mineral oil interfered with both the healing and the prevention of rickets in rats. These results together with those of I suggest that the presence of mineral oil in the gut interferes with the function of vitamin D whether given as cod liver oil by mouth or synthesized by ultra-violet irradiation. It appears that vitamin D formed by irradiation reaches the intestine where it is dissolved in, and excreted with, the non-absorbable mineral oil and is thus prevented from playing its part in the calcification process. It is suggested that these results indicate that one role of vitamin D is to increase intestinal absorption of Ca and P either directly or indirectly.—R. ALLCROFT.

GWATKIN, R., & MOYNIHAN, I. W. (1940). **Avitaminosis in Swine.**—*Canad. J. comp. Med.* **4.** 197–200.

Trouble due to lack of vitamin A, and possibly D, was encountered in a herd of swine on experimental diets deficient in these vitamins. The condition manifested itself by nervous symptoms, paralysis of hindquarters, and marked changes in the skeletal structure. The mineral supply was apparently adequate,

as the addition of pilchard oil, green feed, and skim milk brought about fairly rapid recovery. The first appearance of the condition was in a five-month-old barrow weighing 170 lb. Nine animals became affected and three died.

SHIMOTORI, N., EMERSON, G. A., & EVANS, H. M. (1940). **The Prevention of Nutritional Muscular Dystrophy in Guinea Pigs with Vitamin E.**—*J. Nutrit.* **19.** 547–554.

A typical nutritional muscular dystrophy was readily produced in g. pigs by feeding them on a synthetic diet almost identical with that used in earlier studies. The condition could be prevented by the incorporation of 10% wheat germ in the diet, or by daily dosage with either 0·5 ml. wheat germ oil or 1·5 mg. α-tocopherol. Animals receiving 5% wheat germ in their diets remained clinically normal but excreted slightly subnormal amounts of urinary creatine. It is concluded that when the vitamin B complex is supplied in adequate amounts (the diets used contained 5% yeast), vitamin E is the specific factor concerned in the prevention of the disease.—ALASTAIR N. WORDEN.

EMERSON, G. A., & EVANS, H. M. (1939). **Restoration of Fertility in Successively Older E-low Female Rats.**—*J. Nutrit.* **18.** 501–506.

Female rats were reared from weaning on a vitamin E deficient diet, and their response to dosage with wheat germ oil at the time of conception was studied in relation to age. Animals 3–6 months old invariably produced living young when given a single dose of 0·5 g. of wheat germ oil, but over the period of 7–12 months there was a decline in the response to 0·5 g., and only a third of the 12-month-old animals which were tested produced living young after doses of 4·0 g. of wheat germ oil. After the age of 15 months, wheat germ oil failed to assist fertility even in doses of 10 g., and in these animals no evidence of implantation could be detected at autopsy.—A. N. WORDEN.

BLANCK, E. (1940). Kan s. k. medfödd fölsjuka vara en medfödd $B_1$-avitaminos? **[Suspected Congenital Avitaminosis $B_1$ of Newborn Foals].**—*Svensk VetTidskr.* **45.** 214–217.

B. describes an apparently hopeless case of inanition in a newborn foal, in which joint-ill serum, prontosil and other sulphonamides had no beneficial effect. As a last resort a dose of aneurin was given; the animal responded spectacularly within a few hours and recovered.

B. discusses this and similar cases as an avitaminosis $B_1$, pointing out that the symptoms in foals correspond to what is known of $B_1$ deficiency in other animals.

Cases of acute $B_1$ deficiency in foxes are also referred to, recovery being obtained by aneurin therapy.—J. E.

## PUBLIC HEALTH

FERGUSON, J. (1941). **The Significance of Long-Chained Streptococci in Breed Smears of Market Milk.**—*Cornell Vet.* **31.** 188–192.

Long-chained streptococci in bulked milk submitted to the Breed test are generally considered to be derived from the udder. Sixty bulk samples of milk from a small city, containing at least six cocci per chain in the Breed smear, were investigated during two years.

Mastitis streptococci were found to predominate in 39 cases, but in 21 samples the organisms present in the largest numbers were types not found in the cow's udder, and of these latter samples 16 contained streptococci resembling *Str. cremoris*, a long-chained *Streptococcus* associated with milk utensils.

Of 292 quarter samples of obviously unfit milk, only 50 contained streptococci in numbers sufficient to be detected in mixed milk by the Breed smear in which 1 : 300,000 or 1 : 500,000 c.c. of milk is represented in each microscopic field.—H. E. BYWATER.

THORNTON, H. R., MCCLURE, F., & SANDIN, R. B. (1941). **The Reduction of Resazurin in Milk and Aqueous Solutions.**—*Canad. J. Res.* Sect. B. **19.** 39–48. [Authors' summary copied *verbatim*].

The action of resazurin in milk is complex and not as yet clearly understood. The various resazurin tests have been proposed as practical tests for estimating bacterial populations in milk before they have emerged from the experimental stage. A significant proportion of results cannot at present be interpreted with the reasonable certainty necessary to justify widespread use of these tests by the dairy industry.

MADER, C. K. (1940). **Ropy Milk, Its Cause and Prevention.**—*Canad. J. comp. Med.* **4.** 203–205.

After defining the term "ropy milk" and indicating the bacteria which usually cause it in Canada, M. describes in detail a simple method for its detection. Prevention can best be attained by (a) the maintenance of proper pasteurizing temperatures in the plant together with thorough cleansing and sterilization of all equipment, and (b) the adoption of sanitary measures in the handling of the milk, cows, etc. on the farm.—J. L. BYRNE.

HARRISON, J. (1941). **Lancefield Group B Streptococci** (*Str. agalactiae*) **on the Hands of Milkers and Others.**—*J. Dairy Res.* **12.** 18–23. [Author's summary copied *verbatim*].

Lancefield Group B streptococci have been recovered from the hands of milkers even in herds where infection was very light. Since these organisms had the biochemical reactions of *Str. agalactiae*, and since none were recovered from the hands of non-milkers, it is considered that they were identical with this organism and that the milkers' hands are a potential source of danger to cows. The methods of disinfection at present in use have been criticized and suggestions for improvements made.

THOMAS, S. B., & THOMAS, B. F. (1940). **The Incidence of Tubercle Organisms in Milk Produced in Mid-Wales.**—*Welsh J. Agric.* **16.** 248–251.

From 1930–40, g. pig inoculation tests were made with 1,574 bulk herd milk samples, from five Welsh counties. Thirteen (1·1%) of 1,190 samples of ungraded raw milk were positive, and two (0·5%) of 434 samples of accredited milk were infected. Tubercle bacilli were demonstrated in 19% of 121 samples from abnormal udders.

The incidence of TB. infection in cattle in certain districts in Wales was as low as 2·6%. In July 1939, there were 2,658 attested herds in the Principality, 92% of these being in South Wales.

The danger is emphasized of feeding infected bulked creamery products to calves. 6·4% of 62 samples of raw skim milk from two creameries were infected with the tubercle bacillus. Although of the samples of bulked pasteurized skim milk tested none was found to be infected, application of the phosphatase test showed that only 50% of the samples were efficiently pasteurized. High-temperature, short-time pasteurization was efficient, but flash heating to 150°F., and pasteurization in churns by means of a steam hose, were not.

QUEVEDO, J. M. (1940). Resultados obtenidos en los cobayos inoculados con muestras de leche, antes y después de pasteurizadas a 63°. **[Results of the Inoculation of G. Pigs with Milk Samples before and after Pasteurization at 63°C].**—*Rev. Med. vet., B. Aires.* **26.** 351–380.

Q. took 41 samples of milk, heated part of each at 63°C. for 30 min. and inoculated each heated and unheated sample into g. pigs. Eight g. pigs inoculated with raw milk samples and one of those receiving heated samples developed lesions of TB. Serum from 13 of the g. pigs which received the raw milk and from three which received the heated milk gave positive agglutination reactions for brucella infection. In various samples streptococci of varying pathogenicity were found.—MILLER WATSON.

MENTON, J. (1940). **Brucellosis in the Midlands of England.**—*Med. Offr.* **63.** 33–35.

The presence of the specific agglutinins is not an infallible indication of *Br. abortus* infection in milk. *Br. abortus* was recovered from 29·1% of milk samples showing agglutinins and from 9·1% of milk free from agglutinins. No evidence of infection was discovered in 50 samples of butter from retailers nor in 60 samples of goat's milk.

Rabbits, rats, and mice from infected farms were all free from infection as were 21 groups of insects, mostly flies (the latter were not collected by M.). Fifty samples of pond water also proved negative by cultivation and g. pig inoculation.

More reliable results are obtained from g. pig sera if readings are taken at the third, sixth, and ninth week after inoculation with milk samples, than if taken only at the usual six-week period.

The strains recovered were all *Br. abortus* and conformed to the $CO_2$ and the bacteriostatic dye requirements.

The precipitin reaction was a better criterion of recent and, therefore, probably active infection, than the complement-fixation test. Precipitin produced by hydrochloric acid extraction gave the best antigen.—H. E. BYWATER.

Dolman, C. E., Hudson, V., & Mathias, D. G. B. (1939). **Further Observations on Brucellosis in and around Vancouver.** —*Canad. publ. Hlth J.* **30.** 100–104.

This paper records the bacteriological and serological examinations of milk samples over a period of eight months while raw milk was being supplied to the City and an effort was being made to control *Br. abortus* infection by testing and removal of reactors. During that time at least five acute cases of human brucellosis occurred in the City. Only 6 of 53 raw milk dairies showed definite improvement in their monthly whey agglutinin records. Cultural findings showed that no significant reduction in the brucellosis hazard was brought about by the methods adopted. The authors are uncompromisingly in favour of compulsory pasteurization.—R. Gwatkin.

Kester, W. O. (1938). **Army Food Inspection.** —*Canad. J. comp. Med.* **2.** 301–306.

The development of meat inspection and the duties of veterinary officers in the U.S.A. are outlined. The object of army food inspection is two-fold, being first the protection of the health of the troops, and second to ensure that all specifications are met, and the designated quality and grade of products procured.

—P. J. G. Plummer.

Welch, H., Ostrolenk, M., & Bartram, M. T. (1941). **Rôle of Rats in the Spread of Food Poisoning Bacteria of the Salmonella Group.**—*Amer. J. publ. Hlth.* **31.** 332–340.

Rat and mouse excreta, collected in areas throughout the U.S.A., were found to contain food poisoning organisms of the salmonella type in only 1·7% of 420 specimens examined (six from 340 rat and one from 80 mouse specimens). The significance of rats and mice as vectors of such organisms appears to be overemphasized, and it is pointed out that very few outbreaks have been definitely traced to rodents. *S. enteritidis* was found to be present in the excreta of naturally infected rats when the excreta was kept at room temperature for 148 days, but not at the 182nd day.—H. E. B

## THERAPEUTICS

James, G. V., & Fuller, A. T. (1940). **The Absorption, Conversion and Therapeutic Action of Benzylsulphanilamide.**—*Biochem. J.* **34.** 648–656, [Authors' summary copied *verbatim*].

Benzylsulphanilamide [proseptasine of May and Baker or M. & B. 125] is converted in the body to sulphanilamide which is maintained at a low but steady concentration in the blood; the therapeutic activity of the drug is due to the sulphanilamide produced.

Shelswell, J., & Williams, R. T. (1940). **Studies in Detoxication. 6. Ethereal Sulphate Formation in the Rabbit after Administration of Sulphanilamide.**—*Biochem. J.* **34.** 528–531.

Rabbits dosed with sulphanilamide at levels of from 0·21–1·0 g. per kg. body weight excreted a proportionately increased amount of ethereal sulphate in the urine. On the assumption that one molecule of the conjugated sulphate is derived from one molecule of the drug, between 6 and 12% of the dose of sulphanilamide is converted into a hydroxy compound, probably a phenol, which is then excreted as a conjugated sulphate. Although sulphanilamide in many cases (but not all) caused a diuresis, controlled observation of the water output showed that water administration had no effect on the ethereal sulphate formation.

—Alfred Eden.

Locke, A., Main, E. R., & Mellon, R. R. (1941). **Carbonic Anhydrase Inactivation as the Source of Sulphanilamide "Acidosis".**—*Science.* **93.** 66–67.

The authors report the independent discovery, concurrently with that of Mann & Keilin (1940) of the anti-carbonic anhydrase property of sulphanilamide. Carbonic anhydrase facilitates the conversion in the bloodstream of $CO_2$ into bicarbonate. *In vitro* its catalytic activity was completely inhibited by sulphanilamide-like compounds containing an unsubstituted sulphonamide or sulphonhydrozamide grouping, but the inhibition was in no way dependent upon the *p*-amino grouping which is essential for therapeutic activity. The effects produced by sulphanilamide *in vivo* are immediately apparent and give rise to the respiratory distress which would be anticipated to follow carbonic anhydrase inactivation. The loss of appetite is suggested as being due to a

diminished capacity for acid secretion which is optimum only when the carbonic anhydrase of the parietal cells functions unimpaired by inactivating agents. It is known that the growth of most group A haemolytic streptococci in human blood is favoured by increase of free $CO_2$ in the blood and retarded by decrease; inactivation of carbonic anhydrase would tend to retard conversion of metabolically produced $CO_2$ into bicarbonate which would probably favour growth of streptococci and counteract bacteriostasis. The authors suggest that sulphanilamide, with its unmodified sulphonamide grouping capable of carbonic anhydrase inactivation, has the potentiality not only of increased toxicity but also of lowered bacteriostatic efficacy.—ALFRED EDEN.

COLLIER, H. B. (1940). **Enzyme Inhibition by Derivatives of Phenothiazine and of Sulphanilamide.**—*Canad. J. Res.* Sect. B. **18.** 345–350.

Working on the hypothesis that chemotherapeutic agents act by poisoning strategic enzyme systems, C. has demonstrated that oxidation products of phenothiazine and of sulphanilamide strongly inhibit catalase and cytochrome oxidase. Both of these enzymes are haemin catalysts present in all aerobic organisms. This type of inhibition may offer an explanation of the anthelmintic and bactericidal action of these compounds, *viz*, by poisoning the respiratory mechanism of the cell. Toxicity to the host may be explained in similar fashion, through an effect on the tissue enzymes, or on the haemoglobin.—T. W. M. C.

SCHNÜCKE, R. (1939). Fortschritte der Chemotherapie unter besonderer Berücksichtigung der Chemotherapie der bakteriellen Infektionen. [**Advances in Chemotherapy and Particularly the Chemotherapy of Bacterial Infections**]. —*Chemikerztg.* **63.** 401–404.

This is a review article, dealing mainly with the work of DOMAGK, MIETZSCH, and KLARER, who investigated a large number of azo compounds and found that when a sulphonamide group was introduced in the para position a specific action against streptococci *in vivo* in mice could be produced. The active compound first produced (prontosil) also gave remarkable clinical results. The simpler compound, sulphonamide, was then found to have chemotherapeutic effects and a large number of derivatives were prepared and investigated. Three diseptal compounds are considered to be of importance of which diseptal A (uleron) has been used clinically.—J. M. ROBSON.

RAJČEVIĆ, M., & OKLJEŠA, B. (1940). Pokušaji sprečavanja i liječenja govede bruceloze streptazolom. [**Prevention and Cure of Bovine Brucellosis by Streptazol**].—*Vet. Arhiv.* **10.** 285–296. [Abst. from German summary].

Streptazol (Yugoslav sulphanilamide), given for six months at ten-day intervals to naturally infected cows, had no appreciable effect on brucella infection, as judged by the agglutination titre. It also failed to prevent infection in non-reactor cows introduced into an infected herd, and to stop infection developing in an artificially infected cow.

I. SCHOOP, G., & STOLZ, A. (1941). Chemotherapeutische Untersuchungen an Gasödemen. Teil I. Pararauschbrand. Teil II. Novyödem. [**Chemotherapeutic Experiments on Gas Gangrene. I. Malignant Oedema. II. *Clostridium novyi* Infection**].—*Dtsch. tierärztl. Wschr.* **49.** 153–158 and 181–183.

I. The value of mesudin [apparently a sulphonamide, of which the composition is not given] in the treatment of malignant oedema was investigated. A 1·5% solution produced a bactericidal effect *in vitro*. The drug produced some prolongation of life in experimentally infected animals but did not save life as a rule. The toxicity of the drug is comparatively high. No better results were obtained when mesudin was given in combination with ascorbic acid.

II. The value of mesudin in the treatment of gas gangrene due to *Clostridium novyi* was investigated in g. pigs. The treatment produced a slight prolongation of life, but did not save a significant number of animals.—J. M. R.

PEATT, E. S. W. (1939). **The Treatment of Tetanus by Forced Exercise.**—*J. R. Army vet. Cps.* **10.** 161–163.

P. relates the history of two horses and a mule which recovered from tetanus after forced exercise. The horses were given anti-tetanic serum as well as the exercise. It is suggested that exercise may be beneficial by increasing heart action and the circulation of the blood, which with the muscular movements causes the tetanus toxin to be more rapidly diffused, so

that it reaches the central nervous system " in a more dilute form ".—J. A. GRIFFITHS.

JASTRZEBSKI, D. (1939). Wyniki stosowania antistreptyny w leczeniu niektórych schorzeń. [**Treatment of Equine Diseases by " Antistreptine " (Prontosil Group)**].—*Wojsk. Przegl. weteryn.* **10.** 211–221. [Abst. from French summary].

In affections of the upper respiratory tract, administration of " antistreptine " was followed by a rapid decrease in temperature and prompt recovery. In strangles also there was a rapid lowering of temperature, with healing of the lesions, and in some cases prompt recovery.

DOUGLAS, K. L., & WALKER, R. V. L. (1939). **The Use of Neo-Prontosil in Strangles.**—*Canad. J. comp. Med.* **3.** 166–169.

Neo-prontosil administered in repeated intramuscular doses of 25 c.c. controlled infection with strangles in a small number of cases treated and promoted rapid recovery without suppuration.—P. J. G. PLUMMER.

STEWART, D. F. (1940). **The Efficacy of Udder Infusion with Entozon as a Treatment for Infection with Group B Streptococci** (*Str. agalactiae*).—*Aust. vet. J.* **16.** 108–111.

The efficiency of udder infusion with a 1 : 1,250 solution of entozon as a treatment for bovine contagious mastitis was tested on 40 infected cows from two herds. The solution in distilled water was infused at approximately blood heat under gravity pressure. The udder was first cleaned, milked out, and stripped. The teat siphon was inserted with due aseptic precautions. The solution was allowed to remain in the quarter for 7 mins. and then milked out, and the udder was stripped as frequently as possible for the next 24 hours. In dry cows a solution of 1 : 500 was employed and allowed to remain 24 hours in the quarter before being removed. Milk samples were examined seven days after treatment. All cows were required to pass two bacteriological examinations at an interval of one week before being considered free from infection.

*Str. agalactiae* was eradicated from 70% of the infected cows after three treatments.

—H. B. CARTER.

STEVENSON, W. G. (1939). **Results of Administering Sulfanilamide for the Treatment of Bovine Mastitis. Preliminary Report.**—*Canad. J. comp. Med.* **3.** 147–160.

Ten cows harbouring streptococci in their udders were given 648 g. each of sulfanilamide in eight days. This did not eliminate the streptococci from any of the udders. The dosage had very little effect on appetite, temperature, or milk secretion. The sulfanilamide content of the milk of all quarters was very similar, the variation not exceeding 0·2 mg. per 100 c.c. Appetite, period of gestation, and clinical symptoms had no apparent influence on the concentration in the blood or milk, but the amount of milk secreted did appear to have some influence on this. Three samples of blood kept in the refrigerator for seven days showed a decrease in sulfanilamide content. The drug had no effect on the agglutinin titre for brucellosis.—R. GWATKIN.

SPINK, W. W. (1939). **The Bactericidal Effect of Sulphanilamide upon Pathogenic and Non-Pathogenic Staphylococci**—*J. Immunol.* **37.** 345–358.

In a study of the bactericidal effect of sulphanilamide *in vitro* upon 12 pathogenic strains of *Staphylococcus pyogenes aureus* and seven strains of *Staph. albus*, a known number of organisms was suspended in broth or sterile urine with or without the addition of graded concentrations of the drug. After incubation for 24–72 hours at 37°C. or 40°C., the presence of viable organisms was detected by subculture in liquid and solid media. Little or no bactericidal effect was exerted by high concentrations of sulphanilamide upon suspensions of all the strains in peptone broth incubated at 37°C., although incubation at 40°C. enhanced the bactericidal effect. The drug was bactericidal for suspensions of all strains in urine with a maximum effect at 40°C. The addition of small amounts of peptone to suspensions in urine completely inhibited the bactericidal action of the drug.—R. O. MUIR.

I. DE BORCHGRAVE, O. (1939). Trypanociede werking " in vitro " van " argoflavine " en " atebrin ". [**Trypanocidal Effect of Argoflavine and Atebrin** *in vitro*].—*Ann. Soc. belge Méd. trop.* **19.** 489–493. [In Dutch : French summary].

II. DE BORCHGRAVE, O. (1939). Photodynamie van " argoflavine " voor " Trypanosoma gambiense ". [**Effect of Argoflavine on Light Sensitivity of**

*T. gambiense*].—*Ibid.* 495–500. [In Dutch: French summary].

I. The author tested argoflavine (a silver complex of 3:6-diamino-10-methyl-acridine-lactate) and atebrin on an ordinary strain of *T. gambiense* and also argoflavine on an arsenic-resistant strain of the organism. These drugs at a concentration of 0·2% sterilized *in vitro* the blood of g. pigs heavily infected with the trypanosome. The arsenic-resistant strain was twice as sensitive to argoflavine as the ordinary strain, the former becoming avirulent after 20 min. at a concentration of 1 : 30,000, and the latter only after the same time at a concentration of 1 : 15,000.

II. The author compared the effects of argoflavine on the motility of *T. gambiense* exposed to diffused daylight or to intense illumination by an electric lamp. The motility of the trypanosome was lost ten times more quickly by exposure to electric light than to daylight. An arsenic-resistant strain was more susceptible to the photodynamic action than an ordinary strain. The author has not observed the phenomenon described by several investigators, *i.e.* the rapid disappearance of the blepharoplast through the action of acridine derivatives.

The light sensitivity may be the consequence, not only of the trypanocidal power of the drug, but also of the diminishing resistance of the parasite to the influence of light.—L. Tobback.

Levine, P. P. (1941). **The Coccidiostatic Effect of Sulfaguanidine (Sulfanilyl Guanidine).**—*Cornell Vet.* **31.** 107–112.

L.'s earlier work, having shown that the use of sulphanilamide and sulphapyridine was of some benefit in caecal coccidiosis of poultry, led to the study of the effect of allied compounds. Sodium-2 sulphanilamidobenzoate monohydrate, sodium bisulphanilamide, and sodium sulphanilyl sulphanilate were useless. The effectiveness, or otherwise, of the drugs was assessed by symptoms, P.M. examination, and comparisons of oocyst counts in treated and control birds. Sulphaguanidine, at a concentration of only 0·5% of the ration, prevented infections with *E. praecox*, *E. mitis*, *E. maxima*, and *E. hagani*; at concentrations of 1·0–1·5% of the ration, reduction in the severity of the infections with *E. tenella* and *E. necatrix* was observed. L. believes that this drug is the most promising coccidiostatic agent yet investigated. Like other promising drugs it exerts no curative effects on already existing infections with *E. tenella* and *E. necatrix*.—C. Horton Smith.

Levine, P. P. (1941). **Sulphur Therapy in Experimental Avian Coccidial Infection with *Eimeria necatrix*.**—*Cornell Vet.* **31.** 120–126.

Sulphur in the diet shows a marked beneficial effect on chickens infected with *E. tenella*. As *E. necatrix* resists the action of various substances in much the same way as *E. tenella*, L. undertook experiments to determine the effect of feeding sulphur on the course of *E. necatrix* infection. Results showed sulphur to be of prophylactic but not of curative value. Flowers of sulphur in the proportion of 5% of the ration when fed regularly before and during *E. necatrix* infection prevented mortality, and P.M. examination of the hosts showed only minor intestinal lesions in contrast to heavy mortality and severe lesions in untreated controls. As ill-effects of various kinds frequently follow the administration of sulphur it cannot be regarded as a satisfactory or practicable therapeutic agent.—C. H. S.

Stein, C. D., Osteen, O. L., & Mott, L. O. (1941). **Chemotherapeutic Studies of Infectious Anemia of Horses.**—*Vet. Med.* **36.** 306–310.

In a series of experiments to determine the therapeutic value of a number of compounds in equine infectious anaemia, some experimentally infected horses were treated with the following chemicals :– sulphanilamide, sodium sulphanilyl sulphanilate, sodium ethyl mercurithiosalicylate (" merthiolate "), crystal violet, sodium cacodylate, hydrochloric acid, hexamethylenamine, sodium antimony biscatechol disulphonate of sodium (" fuadin ", stibophen), and potassium permanganate. With the exception of sulphanilamide and sodium sulphanilyl sulphanilate, which were given orally, all chemicals were administered intravenously. A temporary improvement in the general condition and a slight increase in the red cell count were produced by sodium cacodylate in one out of three cases so treated, and by hydrochloric acid in one out of two cases so treated. None of the other drugs tested had any favourable influence on the course of the acute or chronic form of the disease, nor did any of the agents used free infected animals from the virus.—N. J. Scorgie.

*Spann, J. (1938). Die Wasserstoffsuper-

oxydbehandlung in der Dasselbekämpfung. **[Use of Hydrogen Peroxide in the Treatment of Warbles].**—*Forschdienst.* **5.** 472–478. [Abst. from abst. in *Jber. Vet.-Med.* **63.** 522–523].

S. succeeded in causing first- and second-stage warble larvae to leave their holes by injecting therein one or two doses of 0·25 c.c. of 10% $H_2O_2$. Third-stage larvae did not respond.

In view of the resistance of third-stage larvae, this method cannot be recommended except for infestation by very young larvae.

GUTHRIE, J. E., POWICK, W. C., & BANDEL, D. (1941). **Critical Tests with Tetra-alkyl Tin Compounds for the Removal of Raillietina Cesticillus from Experimentally Infected Chickens.**—*N. Amer. Vet.* **22.** 22–24.

The authors refer to another article [*V. B.* **11.** 642.] in which mixtures of tin compounds and synthetic pelletierine hydrochloride were shown to possess synergistic action against *R. cesticillus* in chickens. They now report on two tetra-alkyl tin compounds for the same purpose. Healthy day-old chicks were reared in conditions designed to prevent helminth infestation. Before treatment, the birds were infected with a definite number of mature cysticercoids of *R. cesticillus* from meal beetles (*Tribolium* spp.). Each infected bird was placed separately in a laying battery cage with a wire floor through which faeces dropped to a pan of water. The birds were fasted for 18 hours, then treated and given normal food four hours later. They were weighed at treatment and on the 2nd, 4th, and 14th days afterwards. All faeces were examined for complete tapeworms for two days after treatment, and on the 14th day the birds were killed and examined for tapeworms. An equal control group was used for each trial treatment. Tetraethy tin was found to be toxic in a dose of 0·2 c.c. Tetraisobutyl tin was ineffective in doses of 1 c.c. and 2 c.c. for two parasitized chickens, but a dose of 1 c.c. with 0·2 g. of synthetic pelletierine hydrochloride removed all tapeworms from another bird. A repeat test of this latter dosage on ten birds each having had 50 cysticercoids revealed slight toxic action during the first day only and an average loss in weight of about 10% during the fortnight following treatment, while the controls gained 10% in weight. No harmful effects attributable to the treatment were found at P.M. examination and all tapeworms had been removed. The authors suggest that ionization of this tin compound by pelletierine hydrochloride may have occurred through the action of intestinal enzymes.

—C. V. WATKINS.

ROBERTS, F. H. S. (1940). **A Preliminary Note on the Efficiency of Phenothiazine against some Poultry Helminths.**—*Aust. vet. J.* **16.** 172–174. [Reprinted in *Vet. Rec.* **52.** 819–820. (1940)].

The drug was used at dose rates of 0·4 g. and 1·0 g. per lb. body weight in single doses, and of 1·0 g. per lb. body weight divided into three equal portions and administered on three successive days. Birds were starved overnight and the phenothiazine administered in hard gelatin capsules early the next morning, before feeding.

The drug showed no anthelmintic efficiency against *Cheilospirura hamulosa*, *Raillietina tetragona*, and *Hymenolepis carioca*, and only very slight efficiency against *Capillaria columbae*. A dose rate of 1·0 g. per lb. body weight in a single dose was moderately effective against *Ascaridia galli*. Efficiency against *Heterakis gallinae* was very promising.—H. McL. GORDON.

## POISONS AND POISONING

PULLAR, E. M. (1940). **The Toxicity of Various Copper Compounds and Mixtures for Domesticated Birds. 1 & 2.**—*Aust. vet. J.* **16.** 147–162, and 203–213.

I. This series of observations was commenced in association with the investigation of an extensive outbreak of botulism among wild ducks and other aquatic birds on the Hume Reservoir, Victoria. For some time prior to that outbreak, the luxuriant growth of algae in the impounded water had caused concern and treatment with copper sulphate up to a dilution of 0·2 p.p.m. had been instituted. Residents in the district were inclined to attribute avian mortalities to Cu poisoning either from the treated water or the ingestion of stray crystals of the salt dropped on the bank during the process. Though this hypothesis was regarded as highly improbable, feeding experiments were

begun because of the singular dearth of information regarding the toxicity of copper salts for birds.

Copper preparations were fed in varying amounts to fowls and the following M.L.D.'s determined in g. per kg. live body weight:– single crystal copper sulphate, 0·9; powdered copper sulphate, 0·3–0·5; copper sulphate in 4% solution, 1·0–1·5; copper sulphate mixed with twice its weight of sodium chloride 0·3–0·5; copper carbonate 0·9. Copper sulphate in the dry residue of Bordeaux mixture was only feebly toxic and that in Bordeaux mixture solution was completely non-toxic for fowls.

The availability and absorption of copper is discussed in the light of these results.

Copper preparations were fed to pigeons in varying amounts and the following M.L.D.'s determined in g. per kg. live body weight:– single crystal copper sulphate 1·0–1·5; copper carbonate 1·0–1·5. The following M.L.D.'s in g. per kg. were determined for domestic mallards:– single crystal copper sulphate 0·4; copper carbonate 0·9; and for muscovy ducks:– single crystal copper sulphate 0·6.

The symptoms and pathological anatomy of hyperacute, acute, subacute, mild, and chronic cuprism in birds are described.

II. The maximum daily intake of copper carbonate tolerated by birds was found to be 0·6 g. per kg. live body weight for fowls, and 0·029 g. per kg. for domestic ducks. It was not possible to produce poisoning in fowls by the supply of a 1 : 4,000 solution of copper sulphate in place of drinking water. However, when fowls were given a 1 : 1,000 solution, and ducks a 1 : 4,000 solution, the results were somewhat indefinite, but no obvious copper poisoning was produced in either species.

Dry wheat, pickled with copper carbonate at the rate of 2 oz. per bushel, was found to be unpalatable for fowls, and for this reason not enough grain was consumed to provide a toxic dose. The question of the use of treated grains as food for birds is discussed.—H. B. Carter.

Wickware, A. B. (1940). **Lead Poisoning in Wild Ducks Following Ingestion of Shot.**—*Canad. J. comp. Med.* **4.** 201–203.

This briefly summarizes existing knowledge regarding lead toxicity for various species of birds, treatment recommended, and the probable value of the perfected non-toxic lead and magnesium alloy shot in reducing losses in future.

Tompsett, S. L., & Anderson, A. B. (1941). **The Plasma-Cell Partition of Blood Lead.**—*Biochem. J.* **35.** 48–51.

The concentration of lead in the whole blood of normal human subjects and of patients suffering from lead poisoning was shown to be approximately three times the concentration in the plasma.

In rabbits absorbing lead by mouth, the concentration of lead in the plasma was equal to or greater than that in whole blood.—F. A.

McClure, F. J. (1939). **Fluorides in Food and Drinking Water. A Comparison of Effects of Water-Ingested versus Food-Ingested Sodium Fluoride.**—*Nat. Inst. Hlth Bull.* No. 172. pp. 53.

Chronic fluorosis was induced in groups of young rats by offering them sodium fluoride either in drinking water or in food at levels of 22·6, 45·2, and 90·4 p.p.m. No significant differences attributable to the method of F ingestion could be detected in respect to (a) average rate of live weight increase, (b) F and ash content of bones and teeth, (c) gross appearance of the teeth, and (d) the total amount of F retained within the body. 180 p.p.m. NaF in the drinking water induced acute toxic effects. Retention of F in young rats at the concentrations studied varied from 30–40% of the intake. The degree of tooth hypoplasia closely reflected the F intake.

The effects of NaF ingestion in the young rat were (a) some stimulation by 22·6 p.p.m. F in the diet of appetite and live weight increase, (b) stimulation of water drinking, (c) decreased rate of live weight increase at levels exceeding 45 p.p.m., and (d) increased bone-ash content at ingestion levels ranging from 22·6–600 p.p.m. F (as NaF). The presence of 0·03–0·04% was the maximum F content of rat teeth consistent with their retaining their normal macroscopic appearance.

The literature of chronic F poisoning and details of the methodology for the determination of F in biological products are given. Extensive tables of the F content of a large number of foods are also included.—Alfred Eden.

Greenwood, D. A. (1940). **Fluoride Intoxication.**—*Physiol. Rev.* **20.** 582–616.

The distribution of F in the combined state in nature is very wide and the use of its compounds in industry leads to increased ingestion

of F by man and animals. The exact role of the element in physiological processes is obscure, but it is a general protoplasmic poison and can inhibit many enzymatic reactions.

Acute poisoning is characterized clinically by salivation, nausea, vomiting, urination, muscular weakness, excitement, tremors, convulsions, and lowering of blood pressure. Death is due primarily to inhibition of respiration. The acute toxic dosage is about 0·5 g. per kg. body weight for mammals *per os*, and 0·08–0·15 g. per kg. intravenously or subcutaneously.

Manifestations of chronic F poisoning in various parts of the world include mottled teeth and osteosclerosis, particularly amongst workers in industrial F processes, and dental and osseous diseases of cattle and sheep grazing in the regions of industrial concerns which discharge F, or on soils of naturally high F content, *e.g.* the conditions known as " darmous " in North Africa and " gaddur " in Iceland. Mottling of the teeth is the first detectable symptom of chronic F intoxication following the consumption of waters containing more than 1 p.p.m. F, although such waters are said to reduce the incidence of dental caries. The condition has been reported from many parts of the world and is characterized chemically by a greatly increased F content of bones and teeth, associated with concurrent structural damage. Pathological changes in the kidneys, thyroid, and lymph nodes have been reported but await more detailed investigation.

There is considerable variation in the toxicity of different F compounds and in the susceptibility of various species. G. views with concern the increasing use of F-containing fertilizers, feeds, and insecticides.

Among the prophylactic measures suggested is changing the water supply where practicable to one of lower F content or the removal of F from drinking water chemically by the use of certain Ca, Mg, or Al compounds. Suggestions are also made of the more fruitful lines along which further research might be made.—A. E.

Anon. (1940). **Selenium in Soils and Crops.**—*Bull. imp. Inst.* **38.** 249–252.

This article attempts to summarize the problem of Se in soils and crops in the U.S.A. Se occurs widely distributed in soils as the element, as a replacement of S in various minerals, as selenites, and as selenates. The forms most available to plants are organic Se and the selenates. Seleniferous soils are derived from Cretaceous shales and are found in at least nine of the states of the U.S.A. Irrigation schemes in Mexico have led to the appearance of " alkali disease " in stock, the source of the Se being the river flood water. Various plants are selenophilic and the Se uptake varies enormously with the species of plant. Thus some plants are able to concentrate Se in the top layers of the soil by their selective absorption of Se and subsequent decay.

The toxic effects of Se compounds have been put to a limited use as insecticides and in the case of various cotton pests (the cotton stainer and the pink bollworm) a form of control has been introduced by the addition of top dressings of selenates to the soil. The Se is absorbed by the plant and becomes toxic to these pests. The residual soil Se is readily leached out under tropical conditions. Owing to the danger of Se poisoning the cotton seed cannot be fed to stock and thus a serious limitation is imposed upon this means of pest control. The method, however, appears to have decided possibilities.

—Alfred Eden.

Lucas, G. H. W. (1939). **The Saliva Test.**—*Canad. J. comp. Med.* **3.** 67–72.

In Ontario, in order to stop the practice of doping race horses, saliva is taken, when necessary, immediately after a race by a Government veterinarian accompanied by a police officer who meets the horse as it returns to the judges' stand. A good sample is obtained by washing the mouth with 1% acetic acid. The police officer assumes responsibility for the saliva after it has been collected by the veterinarian. Details are given of the laboratory procedure. The Marquis test is usually the first employed for opiates, the vanadic acid test for strychnine, and the analic acid test for caffeine. A positive report should never be returned on two colour tests alone. At least two distinctly different tests, such as colour and crystalline, colour and biological, or crystalline and biological should be obtained. Border-line samples are encountered; these cannot be reported as positive.—R. Gwatkin.

Williams, R. D. (1939). **Genetics of Cyanogenesis in White Clover** (*Trifolium repens*).—*J. Genet.* **38.** 357–365.

Some white clover plants contain considerable quantities of a cyanogenetic (cyanophoric) glucoside although, as W. has confirmed, strongly cyanophoric forms may be grazed for long periods without ill-effect to the stock.

In the present studies, cyanogenesis was determined and the results were clear-cut; all but one of 1,495 of the $F_1$ progeny of acyanophoric plants and plants subsequently shown to be homozygous for cyanogenesis were shown to be cyanogenetic, and similarly the $F_1$ progeny of acyanophoric × acyanophoric individuals were uniformly acyanogenetic. The distributions in the $F_2$ and $F_3$ generations were in close accordance with the ratio of 3 cyanogenetic : 1 acyanogenetic, indicating that the factor for cyanogenesis is a simple dominant. Familial and intra-familial differences in HCN content are attributed to modifying factors acting as intensifiers or diluents.—A. N. W.

LEGG, J., & WHITE, C. T. (1940). **Broom Bush (*Pimelea trichostachya*): A Plant Poisonous to Stock.**—*Aust. vet. J.* **16.** 175–177.

*P. trichostachya* (broom bush, native flax, Borgia's bouquet) is a native plant, a member of the Daphne family (Thymelaeaceae) and occurs widely throughout the south and central west of Queensland and in parts of New South Wales. It is generally abundant on sandy soils.

The plant has been proved poisonous for sheep, resulting in diarrhoea, loss of condition, and death after periods varying from 12–19 days. Autopsy usually revealed slight congestion of the abomasum and intestines. Although one animal consumed up to 20 lb. over a period of three weeks without ill-effects, others died after force feeding with amounts of 5–6 lb.—H. B. CARTER.

HINDMARSH, W. L. (1940). **Poisonous to Stock. Peach Leaf Poison Bush. (*Trema cannabina* syn. *T. aspera*).**—*Agric. Gaz. N.S.W.* **51.** 429–430.

*T. cannabina*, commonly known as peach leaf poison bush or wild peach, has been suspected for many years of being poisonous without definite evidence being obtained.

6 lb. of leaves consumed during two days caused the death of a three-year-old cow, and 13 lb. of dried leaves consumed over a period of three days caused the death of a young steer. 1 lb. of dry leaves consumed during two days produced severe pain in one sheep, while 7 oz. of dry leaves consumed with bran and chaff over six days caused the death of another animal.

The symptoms were ill-defined, consisting merely of depression, abdominal pain, and in one case the passage of a blood clot in the faeces. The main lesions on autopsy were congestion of the abomasum, duodenum, and especially of the ileum; the caecum and colon were congested and contained much clotted blood.—H. B. CARTER.

HART, L. (1940). **Poisonous to Fowls. Seeds of the Plant *Araujia sericifera*.**—*Agric. Gaz. N.S.W.* **51.** 472–474.

The toxicity of the seeds of *A. sericifera*, of the natural order Asclepiadaceae, has been demonstrated for fowls by feeding experiments which indicated that the toxicity increases with the maturation of the seed. 5 g. (the smallest amount fed) were sufficient to cause death. The toxic principle apparently affects the central nervous system causing incoordination of movement, loss of balance, and loss of muscular control. The lesions noted on autopsy were mainly catarrhal enteritis, congestion of the liver and spleen, and submeningeal congestion over the cerebellum. The enteritis is apparently due to an irritant material in the seed.—H. B. CARTER.

GURNEY, E. H., & FRANCIS, W. D. (1940). **Two Plants Poisonous to Stock.**—*Qd agric. J.* **53.** 547–552.

The two plants investigated were *Heterodendron olaefolium* (rosewood or "boonaree"), a tree with a wide distribution in Australia, and *Ximenia americana*, a shrub found commonly along the shores of tropical countries including Northern Australia and New Guinea.

Analyses confirmed the fact that *H. olaefolium* contains a cyanogenetic glucoside, the amount of which varies with the stage of growth, being most abundant in young leaves. The HCN content may be sufficiently high to be dangerous to stock and occurs in greatest amount during late summer and early autumn. This may rise as high as 140–160 mg. HCN per 100 g. dry matter.

*X. americana* contains sufficient HCN at all stages to be toxic to stock, though young leaves have a higher content than mature leaves. As much as 440–460 mg. HCN per 100 g. dry matter have been recorded.—H. B. CARTER.

SERGENT, Et. (1939). Immunité naturelle de certains animaux contre le venin de scorpion. **[Natural Immunity of Certain Animals to Scorpion Venom].**—*Arch. Inst. Pasteur Algér.* **17.** 625–632.

S. tested the effects of scorpion venom on

animals considered refractory to venoms in general, particularly cats, hedgehogs, porcupines, fowls, Algerian frogs, and the scorpion itself. The following results were obtained with the venom of *Prionurus australis* L., the most dangerous scorpion of North Africa. The maximum dose tolerated by cats was 1·88 mg. per kg. body weight, which is the average quantity of venom extracted from one scorpion. Hedgehogs weighing 560–800 g. resisted one similar dose but were killed by two doses; these animals were quickly hyperimmunized by increasing doses. One porcupine (1,800 g. body weight) was killed by a dose of 1·88 mg. per kg. body weight. Fowls appeared to be rather resistant and an antitoxic serum could rapidly be obtained in fowls by increasing injections of venom. One turkey was more sensitive but could also be rapidly hyperimmunized. 20 g. mice were killed in two hours by 1 : 40th of the above-mentioned dose. Algerian frogs (*Discoglossis*) proved very resistant. *P. australis* was not completely refractory to its own venom.—L. Tobback.

Mace, D. L. (1940). **Food Supplies and Chemical Warfare Agents. Contamination, Decontamination and Protection.**—*Vet. Bull. U.S. Army*. **34.** 289–309.

A summary of available information gleaned mainly from European literature, the principles of which are well known in this country.

The effects of war gases upon foodstuffs are given, but knowledge concerning the effects upon food animals is limited. In general it is considered that, provided animals which have been subjected to gases are slaughtered in the approved manner and the organs are found to be normal, the flesh is fit for food if it is boiled and the water poured away. Evidence as to the suitability of lewisite-contaminated animals is, however, lacking, but it is apparently doubtful whether meat from such animals is unfit for human consumption. Experiments upon dogs, given lethal applications to the skin, showed that the amount of arsenic present in the muscle tissue was only about one-ninth of that allowed by the authorities in and upon fruits.

Protective measures described and the tables given are taken from "Food and Its Protection Against Poison Gas", issued by the Ministry of Food in 1941 [*V. B.* **11.** 724.], and the "Protection of Foodstuffs Against Poison Gas", issued by the Home Office A.R.P. Department in 1937.—H. E. Bywater.

—. (1940). **Medical Manual of Chemical Warfare.**—pp. 104 + 15. London: H.M. Stat. Off. [8vo] [2s. 6d.]

An authoritative synopsis, compiled by command of the Army Council, of the various poison war "gases", giving their effects on the human body together with preventive and curative treatment.

Appended is a reprint of the Medical Research Council's "An Atlas of Gas Poisoning" (1937), containing coloured plates which illustrate the effects of war "gases" on man and show a microscopic section of human lung after phosgene poisoning and another after mustard gas poisoning.—H. E. Bywater.

## PHYSIOLOGY

Fraser, T. N., & Rennie, J. B. (1941). **Observations on Factors Concerned in Sedimentation of Erythrocytes.**—*Brit. J. exp. Path.* **22.** 81–90.

The erythrocyte sedimentation rate (E.S.R.) in human subjects was uninfluenced by ingestion of sufficient fat in one meal to render the serum lactescent. It was also unaffected by the ingestion of 40 g. of protein or 100 g. of glucose.

From an analysis of 220 observations on 58 individuals it appeared that the E.S.R. became more rapid (a) with a fall in the albumin content of the plasma, (b) with anaemia as measured by the volume of packed red cells, (c) with an increase in plasma fibrinogen, and (d) with an increase in plasma globulin. Of these (a) was most closely associated with the increase in E.S.R. [The causes of variation in E.S.R. outlined in this abstract will be of interest to veterinarians familiar with the somewhat ambiguous results encountered in diseases of animals.—Ed.]—Francis Aylward.

Hewitt, E. A. (1939). **The Physiology of the Reproductive System of the Fowl.**—*J. Amer. vet. med. Ass.* **95.** 201–210.

The reproductive organs of males and females are described, also the development of the egg and its passage to the cloaca. Some comments are made on abnormal eggs.

—D. D. Ogilvie.

VILLARES, J. B. (1940). Sôbre a concentração iônica do rumen. **[The pH in the Rumen].**—*Rev. industr. Anim.* **3.** No. 1. 102–115. [English summary].

The contents of the rumens of 50 cattle slaughtered in an abattoir were examined and it was found that the pH value varied from 7·3–7·8, using Trenel's ionometer. The material was examined without having been exposed to air or subjected to high temperatures. Exposure to air renders the contents more alkaline, particularly if the temperature be high. Incubation *in vitro* tends to increase acidity.—MILLER WATSON.

MACKAY, E. M., WICK, A. N., CARNE, H. O., & BARNUM, C. P. (1941). **The Influence of Alkalosis and Acidosis upon Fasting Ketosis.**—*J. biol. Chem.* **138.** 63–68.

Estimation of the total ketone values of both blood and urine of fasting albino rats showed that the acidosis produced by administration of HCl was antiketogenic and the alkalosis induced by sodium bicarbonate was ketogenic. Acid administration caused a decrease in the daily excretion in the urine of N and S, and an increase in the liver glycogen concentration, and the alkalosis due to $NaHCO_3$ was followed by a decrease in liver glycogen and in urinary N and S. The authors conclude that the antiketogenic effect of acidosis depends upon increase in protein catabolism with resultant glucose formation, whilst an alkalosis is ketogenic because of its opposite effect upon protein catabolism.—ALFRED EDEN.

FRAZER, A. C. (1940). **Fat Absorption and its Relationship to Fat Metabolism.**—*Physiol. Rev.* **20.** 561–581.

F. reviews recent work on fat absorption including its control by dietary and intestinal factors, the fate of absorbed fat in the intestinal cells, transport in the blood, and distribution in fat depots and other tissues.

He discusses in some detail the "lipolytic hypothesis" that fats are hydrolysed prior to absorption, and suggests that as the evidence available is far from complete, other theories should be considered. There is some evidence for the "partition hypothesis", which postulates (a) that neutral fat can be absorbed unsplit, passing through the lymphatic system and the thoracic duct into the systemic blood and thence to the fat depots, whereas (b) fatty acids (derived in the intestine from hydrolysis of fats) form phospholipins, cholesteryl esters, and soaps and are absorbed mainly through the portal system, passing to the liver. According to this theory the amount of fat going to the depots will depend on the relationship of the quantity of fat in the diet to the lipolytic potentialities of the individual, and obesity may therefore be an expression of relative pancreatic insufficiency.—FRANCIS AYLWARD.

DIBLE, J. H., & HAY, J. D. (1940). **The Nature of Fatty Change in the Kidneys.**—*J. Path. Bact.* **51.** 1–7.

Thirty-six adult rabbits were starved for six days (water being supplied) and the fatty changes in the kidneys were examined histologically and chemically and compared with the changes in body weight and total adipose tissue. As a result of starvation, optically inactive fat appeared chiefly in the wide parts of Henle's tubules, more especially in the descending limb. The extent of the histological changes was roughly proportional to the amount of fat in the kidneys (estimated chemically), and to the quantity of fat in the depots. In 16 control animals there was no correlation between the amount of storage fat and the fat content of the kidneys.

The results indicate that, as in previous work on the heart and liver, the histological appearance of fat in the cells is associated with an increase in the total fat content of the cells, the excess fat coming from outside; *i.e.* the fatty changes in starvation are due to infiltration and not to phanerosis (= "unmasking" of essential fatty constituents of cell protoplasm).—F. A.

TRIMBLE, H. C., & KEELER, C. E. (1938). **The Inheritance of "High Uric Acid Excretion" in Dogs.**—*J. Hered.* **29.** 281–289.

Since the work of BENEDICT, in 1916, it has been known that pure-bred Dalmatian dogs have a purine metabolism which differs markedly from that which is normally found in carnivores and most other mammals. They tend to excrete considerable quantities of uric acid, and have hence a much lower uricolytic index (*i.e.* ratio of allantoin N to the sum of allantoin and uric acid N in the urine) than that of most dogs.

By determining the uric acid excretion of Dalmatians of known pedigree, and that of Dalmatian-Collie crosses, the authors were able to show quite clearly that high uric acid excretion is an almost completely recessive

non-sex-linked character. By appropriate cross-matings it was strongly indicated that a single pair of genes was involved. The factor for high uric acid excretion was not in any way linked with that responsible for the spotted coat which is characteristic of the breed, although it was noted that hybrid animals which had white hairs interspersed among the black of pigmented spots—a condition which was never noted in pedigree Dalmatians—were consistently of low uric acid excretion.

—Alastair N. Worden.

*Majorow, S. N. (1938). **Physico-Chemical Characterization and Salt Content of the Sinovial Fluid in the Ox.**—*Fiziol. Ž.* **24.** 1145–1149. [In Russian: German summary]. [Abst. from abst. in *Jber. Vet.-Med.* **65.** 18].

Tests were made on the normal fluid from the fetlock joint of cattle for dry substance content, ash, Na, K, Ca, Cl, P, $CO_2$, pH, electrical conductivity, viscosity, specific weight, refraction, and depression of the freezing point.

The dry substance content was found to be 2·5%, ash 0·7%. The various ion contents varied considerably, especially that of Cl [no figures]. The $CO_2$ content was fairly constant, in keeping with the pH value of 6·9. The electrical conductivity was $93{\cdot}81 \times 10^{-3}$ and the freezing point depression was 0·68°C. It follows from the latter data that the osmotic pressure of synovial fluid exceeds that of blood. The specific weight was 1·008 and the viscosity varied between 3·7 and 83·7, due to different mucin content values of different samples.

Collier, H. B. (1939). **The Chemistry of the Enzymes.**—*Canad. J. comp. Med.* **3.** 293–300.

This article is not original but is a compilation of work on enzymes by various authors, which for convenience is classified under different heads.

The chemical properties, methods of study, and the mechanism of the action of enzymes are briefly considered, together with a very short discussion of their biological significance and possible applications. The value of the article would have been enhanced by a bibliography.

—L. M. Heath.

Swann, H. G. (1940). **The Pituitary-Adrenocortical Relationship.**—*Physiol. Rev.* **20.** 493–521.

A review of the influence of the pituitary gland upon the functions of the adrenal cortex.

In a number of animals hypophysectomy is followed by rapid atrophy of the adrenal cortex. Even in species in which clear-cut adrenal atrophy does not occur, hypophysectomy causes decreased body growth and atrophy of the thyroid and gonads. These changes are prevented by hypophyseal implants or by injection of suitable hypophyseal extracts. In normal animals such extracts cause hypertrophy of the adrenal cortex. Potent extracts of so-called adrenotropin have been obtained free from the growth-promoting, thyrotrophic, lactogenic, and gonadotrophic hormones of the pituitary. Adrenotropin is secreted by the anterior lobe of the pituitary.

The pituitary appears to exercise complete control over adrenocortical involvement in fat, sugar, and protein metabolism. Its control is partial in the processes tending to protect the animal against intoxication, trauma, and many such states, and slight in dextrose absorption, anorexia and inanition, and vital function, *i.e.* relation to "salt and water" metabolism. Adrenotropin-adrenocortical influence upon muscle metabolism, experimental hypertension, and reproduction in some species is suspected but not yet clearly proved.—A. L. Walpole.

I. Folley, S. J., & Young, F. G. (1940). **Further Experiments on the Continued Treatment of Lactating Cows with Anterior Pituitary Extracts.**—*J. Endocrinol.* **2.** 226–236.

II. Folley, S. J., & Young, F. G. (1941). **Prolactin as a Specific Lactogenic Hormone.**—*Lancet.* **240.** 380–381.

I. Selected groups, each of four lactating cows (British Friesians and Ayrshires maintained at the Agricultural Research Council's Field Station, Compton) were injected repeatedly over periods of 22 days with one of the three following pituitary preparations :– a crude alkaline extract, a prolactin preparation and a glycotropic preparation. Control animals were used. Over the first half of the experimental period there was a marked rise in the milk yields of the animals receiving the crude pituitary extract, but the amounts then fell to normal and afterwards continued on the expected curve of decline. (Total increase in yield over injection period calculated as 16%). The animals receiving the prolactin preparation also showed an initial gain in milk yield (total increase over period of 5%), but the glycotropic

preparation appeared to be without significant effect. There was no evidence of the development of " anti-prolactin " activity in the blood of any of the groups, and there was no significant alteration in the proportions of fatty or non-fatty solids in the milk of any of the animals treated.

It is suggested that, if it be necessary ot draw a distinction between a pituitary substance which initiates lactation and one which increases the yield of an animal already in lactation, the terms " lactogenic " and " galactopoietic " may be used respectively. The remaining discussion is amplified in II.

II. Prolactin preparations are usually assayed by their growth-promoting effect upon the crop-gland of the pigeon. It is pointed out that, from the experiments recorded in I and from earlier experiments, there is considerable reason to doubt that prolactin is a specific lactogenic hormone, and that the galactopoietic properties of pituitary extracts are due to a plurality of factors, of which " prolactin " is one. The varying results obtained from the use of prolactin preparations in clinical practice are thereby explained, and it is emphasized that, as a lactating woman is more analogous to a cow than to a pigeon, the galactopoietic activity of pituitary preparations intended for clinical use should be assayed on mammals.—A. N. W.

I. Korenchevsky, V. (1941). **Sex Hormones and the Basophilic Granulation of the Liver Cells in the Rat.**—*J. Path. Bact.* **52.** 341–347.

II. Ross, M. A., & Korenchevsky, V. (1941). **The Thymus of the Rat and Sex Hormones.**—*Ibid.* 349–360.

I. A review is given of the morphology and the histochemical reactions of the basophile granules of the liver (Berg's stalagmoids), and of the influence upon them of diet.

In experiments with rats maintained on a rich diet, K. showed that the granules decreased in number and often in size after gonadectomy, and returned to normal in gonadectomized rats injected with sex hormones. These changes were observed in most but not all of the rats treated, and appeared to run parallel with changes in the weight and size of the livers.

II. After prepubertal gonadectomy the thymus of rats becomes greater in both relative and absolute weight than that of normal controls. This appears to be the result of a later commencement of the physiological involution of the gland, and also of hyperplasia of thymic tissue.

Injection of androgenic hormones in normal and gonadectomized rats causes a decrease in the size of the thymus ; the effect runs parallel to the strength and dose of the hormone. The change is due to atrophy of the thymic lobules which are in part replaced by adipose and connective tissue.

Injection of oestrogenic hormones causes a similar atrophy and, in addition, an increase in the number of plasma cells in the thymic tissue and a specific hyperplasia of the epithelial structures. These structures, which are present only exceptionally and in undeveloped form in other rats, resemble histologically the first stages of adenoma formation, but in no case do they grow into tumours. Simultaneous injection of androgens does not prevent the specific effects of oestrogen administration, and atrophy is intensified.

It is suggested that oestrogenic hypersecretion may be a factor in the production of thymomas.—A. L. Walpole.

Korenchevsky, V., Hall, K., Burbank, R. C., & Cohen, J. (1941). **Hepatotrophic and Cardiotrophic Properties of Sex Hormones.**—*Brit. med. J.* March 15th. 396–399.

Sex hormones were administered to castrated male and spayed female rats and the resultant effect upon the weight and histological structure of liver and heart are recorded and statistically analysed.

Prolonged administration of oestrogenic hormones produced in both sexes a decrease in body growth and in actual liver weight, but in the case of the esters of oestradiol, an increase in liver weight per unit body weight occurred. The liver cells of treated animals were in some cases slightly smaller than those of untreated controls and this change was correlated with a decrease in the fat content of these cells. Heart weight per unit of body weight was in most cases increased but no histological changes were observed.

In experiments with androgenic hormones no changes in body weight or fat deposition were obtained unless large doses of a strong hormone (*e.g.* testosterone propionate) were given, when both body weight and fat deposition were decreased. In both sexes androsterone and testosterone propionate produced hypertrophy both in actual and in relative

weights of liver and heart. The liver and heart weights of castrated male rats were returned to or towards normal while those of spayed female rats were increased above the figure for normal controls.

When androgenic and oestrogenic hormones were administered together the effect of the oestrogen was predominant if this was given in high dosage. When the oestrogen dosage was comparatively low, androgenic hormones given at the same time were in most cases able to neutralize the depressant effects of the oestrogens upon body growth, liver, and heart.

The therapeutic application of male sex hormones in the physiological stimulation of liver, heart, and kidneys is briefly discussed. —A. L. WALPOLE.

LIPSCHÜTZ, A., VARGAS, L., Jr., JEDLICKY, A., & BELLOLIO, P. (1940). **The Minimum Quantity of Estrogen Required to Induce Atypical Epithelial Growth of The Uterine Mucosa in the Guinea-Pig.**—*Amer. J. Cancer.* **39.** 185–198.

Atypical epithelial growth of the endometrium was induced in the castrated g. pig by as little as 4·5 μg. of oestradiol when this was given as the monocaprylate or 17-benzoate-3-*n*-butyrate in doses of 0·1 μg. over 3½ months. The same treatment sometimes produced pluristratified metaplasia in limited endometrial areas. These changes became more apparent with higher doses of the same esters, *e.g.*, about 40 μg. given in 1 μg. doses over three months, and under these conditions adenomatous polyps also were formed, at the expense of the proliferated uterine glands. With this dosage the polyps sometimes occupied the whole of the uterine cavity; with still higher doses they sometimes extended into the cervix and even into the vagina.

The authors consider that the rapid conversion in woman of the endogenous oestrogens, oestrone and oestradiol, into oestriol and the conjugation of the latter with glucuronic acid, may be regarded as a defence mechanism against the tumorigenic action of these compounds. They also think that the graded reactivity of the genital mucosa to oestrogens may explain the difference in the frequency of occurrence of the pluristratified type of cancer at the cervix and the cylindrical type in the uterus proper in women.—A. L. WALPOLE.

NELSON, W. O. (1939). **Atypical Uterine Growths Produced by Prolonged Administration of Estrogenic Hormones.**—*Endocrinology.* **24.** 50–54.

N. reports that the daily administration of oestrogenic hormones to normal or spayed female g. pigs consistently resulted in the occurrence of cystic glandular hyperplasia of the uterine cornua. In animals treated for six months or longer this condition is extended to the fundus; such animals also show a marked adenomatous hyperplasia of the fundic endometrium. At the bases and tips of the hyperplastic glands the epithelial cells become metaplastic, a condition which is most marked in the cervical region. The uteri of 15 animals showed multiple subperitoneal fibro-myomatous growths. All animals bearing these tumours showed periods of spontaneous vaginal bleeding. These periods were induced in five out of eight animals by stopping the hormone injections after administration for a suitable interval.—N. J. SCORGIE.

## TECHNIQUE AND APPARATUS

GRAY, P. H. H. (1941). **Staining of Bacteria and Certain Fungi. [Correspondence].** —*Nature, Lond.* **147.** 329.

A solution of 0·5% malachite green and 0·05% basic fuchsin is used to stain spores, acid-fast organisms, or vegetative cells in a single process. The stain is applied for 1 min. over steam to the fixed film; spores and acid-fast organisms are stained a greenish blue, although the latter may show violet granules; all non-acid fast organisms tested were violet or pink. A saline solution of the stain is used for differentiating the structure of fungi grown on agar plates.—K. C. SELLERS.

LUTZ, A. (1939). **A New Method of Enclosing and Preserving Small Objects for Microscopic Examination.**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 659–663. Osaka: Osaka Natural History Society. [In English].

L. advocates the use of capillary glass tubes in which small objects may be enclosed in any desired medium and subsequently sealed. In

order to examine the object under the microscope, the whole tube is immersed in liquid of the same refractive index as that inside the capillary and contained in a flat-bottomed dish. The many advantages are shown of this mount over hollow slides and similar devices, and many useful hints are given on preparation, manipulation, storing, etc.

ROE, A. F. (1940). **A Sterile Transfer Chamber.**—*J. Bact.* **39.** 589–592.

R. describes the construction of a small sterile transfer chamber, simple in design, involving no fundamental originality, and very satisfactory in use. The original article should be consulted for the full details of construction. —ALFRED EDEN.

RIGLER, N. E., & GREATHOUSE, G. A. (1940). **An Automatic Zero Pipette for Dispensing Sterile Culture Media.**—*Science.* **92.** 363–364.

An all-glass device (illustrated) is attached to a large flask containing the liquid culture medium in bulk and the whole is autoclaved. After cooling, the device permits the automatic dispensing of the medium into a series of culture vessels without the possibility of contamination.—J. E.

PURCHASE, H. S. (1941). **The Cleaning of Berkefeld Candles by Peptic Digestion.** —*Vet. Rec.* **53.** 231.

Difficulties in obtaining supplies of Berkefeld candles make it necessary to devise some means of prolonging the life of these candles after they have been used for filtering serum employed in the preparation of live culture vaccine for bovine contagious pleuro-pneumonia. Prolonged washing with water failed to remove material blocking the pores. The method of cleaning adopted was first to wash with water by suction and then to allow 750 c.c. of a peptic digestion fluid to flow through the candle by gravitation; the fluid consisted of 0·2% pepsin in approximately 0·1N HCl. After the passage of the fluid through the candle the latter is soaked in the digesting fluid for 48 hours at 37°C., washed again with water by suction, and then a litre of 0·1% $KMnO_4$ is allowed to filter through the candle under gravity. The fluid passing out of the candle should eventually possess the purple $KMnO_4$ tint, otherwise another litre of $KMnO_4$ is run through. The excess $KMnO_4$ is removed from the candle by again washing with water and allowing 500 c.c. of 10% sodium sulphite acidified with 5% HCl to gravitate through. Finally, the candle is washed with distilled water under suction. The candle is then stored in distilled water. Comparative tests of the rate of passage of serum through a new candle and one which has been treated 12 times showed the efficiency of the latter to be only slightly less than that of the former, and some candles, so cleaned, have been used 20 times without causing the rate of filtration of serum to be slow enough to be unsatisfactory.—A. E.

SVEDBERG, T., & PEDERSEN, K. O. (1940). **The Ultracentrifuge.** pp. x+478. 4 appendixes. Oxford: Clarendon Press. [8vo].

In view of the increasing interest in the use of ultracentrifugal methods this book is welcome as summarizing the experience already gained in such methods. The first part deals with the theory of sedimentation; the second with the construction and operation of the different kinds of ultracentrifuges including those driven by air; in the third part different methods of observation and the treatment of the experimental data are described, and the last part gives a survey of the results obtained with the Uppsala types of ultracentrifuges. An excellent bibliography is given at the end together with references of experimental data obtained with the air-driven ultracentrifuges.—R. ALLCROFT.

ALLEN, C. E. (1940). **The Identification of Live Stock by Tattooing.**—*Sci. Agric.* **21.** 180–197.

In view of alleged difficulties in regard to the reading of tattoo marks in certain animals, this investigation was undertaken to secure definite data on technique, pigments, site, and most suitable age for tattooing. In an effort to obtain a coloured tattoo ink for dark pigmented animals, 46 different pigments were tested, all of which were found to be unsuitable. For general use, however, the most satisfactory pigment was found to be carbon black in the form of a paste. For horses and dogs the inside of the lower and upper lips respectively were found to be satisfactory sites. The most suitable site for cattle was the inner aspect of the ear, and limited tests showed that even with breeds such as Friesian and Aberdeen Angus, carbon paste constituted a fairly legible tattoo mark.—N. J. SCORGIE.

## MISCELLANEOUS

HENDERSON, W. W. (1940). **Livestock Development in Nigeria.**—*Vet. Rec.* **52.** 137–140.

There are approximately 5 million cattle, 10 million goats, and 3 million sheep in Nigeria. The cattle are mainly of the Zebu type although there is a so-called " Pagan " or " West African Shorthorn " type in the coastal belt which, unlike the Zebu, is resistant to trypanosomiasis. Rinderpest has been the most serious epizootic amongst cattle, but owing to the practice now being adopted of immunizing against the disease, outbreaks are only local in extent and the mortality is small. Some 450,000 cattle are immunized annually against rinderpest, 551,000 against blackleg, 195,550 against contagious pleuro-pneumonia, 11,000 against anthrax, and 29,500 against haemorrhagic septicaemia.

Meat is the most important product of the livestock industry and about 400,000 cattle and 4,000,000 sheep and goats are slaughtered annually.

Hides and skins are important export products reaching a value of about one million pounds annually. The most important part of the trade is the export of goat skins overseas, those of the Sokoto red goat and the Kano brown goat being in great demand. A hide and skin improvement scheme, instituted by the veterinary department, has proved of considerable benefit to the industry.—H. V. HUGHES.

MOHLER, J. R. (1939). **Federal Poultry Research at the Agricultural Research Center, Beltsville, Md.**—*Misc. Publ. U.S. Dep. Agric.* No. 368. pp. 32.

A brief description of the facilities and equipment for poultry research at the Agricultural Research Centre at Beltsville serves as an introduction to accounts of the work carried on there. A variety of topics is discussed: these range from investigations into poultry breeding, physiology of development, and parasites, to poultry flesh, egg quality, and nutritional studies. It is stated, for example, that in plumage structure, hen feathering dominates cock feathering and is inherited on a monohybrid basis; that a large proportion of embryo mortality during the last three days of incubation is due to the faulty position of the embryos within the shells; that the mucin content of egg-white determines the relative quantities of thick and thin white. There are interesting details of the planning of poultry units and the means adopted for their effective isolation.

The parasitology section has devoted some work to the control of coccidiosis by diet and to reducing the symptoms by tonic treatment. It is claimed that drinking water containing traces of iron sulphate and copper sulphate is beneficial in that infected birds gain more weight and pass fewer oocysts than controls; fewer haemorrhages are observed. Better results are obtained if the birds are treated with the tonic before infection.

Barium antimonyl tartrate, when used as a dust, is an effective remedy for the removal of gapeworms from the tracheas of young turkeys and chickens. A short survey of inquiries into fowl leucosis, avian encephalomyelitis, and avian tuberculosis closes the report.—C. H. S.

—. (1941). **The Animal Disease Station of the Bureau of Animal Industry [Beltsville].**—*Lederle vet. Bull.* **10.** 47–50.

This consists of just over a page of text and two pages of photographs. The station was situated at Bethesda, Maryland, from 1897 to 1935, when it was moved to its present site at Beltsville, Md., about 13 miles from the B.A.I. headquarters at Washington. It forms a part of the Government Research Centre at which many departmental research sections are situated. Dr. EICHHORN has been in charge of the station since 1938. The standard brucella antigen is prepared there as well as strain 19 vaccine for calfhood vaccination.—J. E.

—. (1940). **Medicofilm Service of the Army Medical Library. Its Purpose and Plan of Operation Together with a List of more than 4000 Abbreviated Titles of Medical Periodicals Currently Received by this Library.** pp. 26. Washington, D.C.: Library of the Surgeon General's Office. [8vo].

The United States Army Medical Library, Washington, has instituted a microfilm service whereby reproductions of printed matter are photographed on 35 mm. film, and can be read by means of a projecting apparatus magnifying five or more diameters. The charge is a flat rate of 30 cents per complete article, not exceeding 30 pages in length, and an additional charge of 10 cents per extra ten pages or fraction thereof; the magnifying viewers can

be obtained at prices ranging from $1.50–$25. Enlargements on 6″ × 8″ sheets of photographic paper can be supplied at 10 cents per page in addition to the charge for the original microfilm. Only articles from periodicals received by the Army Medical Library can be supplied, and a list of the 4,034 journals taken is given in the booklet describing the service.

The address is :– Medicofilm Service, Army Medical Library, 7th St. & Independence Ave., S.W., Washington, D.C., U.S.A.

REED, L. J., & MUENCH, H. (1938). **A Simple Method of Estimating Fifty Per Cent Endpoints.**—*Amer. J. Hyg.* **27.** 493–497.

This method of estimating the 50% endpoint in biological reactions is based on observation of the number of survivals from each of a number of small groups of animals inoculated with increasing dilutions of a given serum or vaccine. A hypothetical numerical example is given to illustrate the method employed.

A group of six animals was employed at each dilution, and the numbers dying and surviving are given in the following table.

*Filtration of a hypothetical protective serum*

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| Dilution | Alive | Dead | Total Alive | Total Dead | Per cent. Mortality |
| 1 : 1 | 6 | 0 | 32 | 0 | 0 |
| 1 : 2 | 6 | 0 | 26 | 0 | 0 |
| 1 : 4 | 5 | 1 | 20 | 1 | 5 |
| 1 : 8 | 6 | 0 | 15 | 1 | 6 |
| 1 : 16 | 4 | 2 | 9 | 3 | 25 |
| 1 : 32 | 2 | 4 | 5 | 7 | 58 |
| 1 : 64 | 2 | 4 | 3 | 11 | 79 |
| 1 : 128 | 0 | 6 | 1 | 17 | 94 |
| 1 : 256 | 1 | 5 | 1 | 22 | 96 |

Column D is the result of adding column B from the bottom, the assumption being that any animal surviving a given dilution of the serum would also have survived a lower dilution; column E is obtained by adding column C from the top on the assumption that an animal dying at a given dilution would have died at a higher one. On plotting curves for columns D and E against the corresponding dilutions, a point of intersection is obtained at which the number of survivals and deaths are equal, *i.e.* the 50% endpoint of the filtration. The dilution is then read off directly.

To avoid possible error due to " accidental " occurrence of survivals at high dilutions, or deaths at low, an abridged tabulation method is also discussed. This is obtained by taking an equal number of dilutions on each side of the endpoint as illustrated in the following table.

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| Dilution | Alive | Dead | Total Alive | Total Dead | Per cent. Mortality |
| 1 : 8 | 6 | 0 | 14 | 0 | 0 |
| 1 : 16 | 4 | 2 | 8 | 2 | 20 |
| 1 : 32 | 2 | 4 | 4 | 6 | 60 |
| 1 : 64 | 2 | 4 | 2 | 10 | 83 |
| 1 : 128 | 0 | 6 | 0 | 16 | 100 |

A calculation is made of the " proportionate distance " defined as :

$$\frac{\text{50\% – \% mortality at dilution next below}}{\text{\% mortality next above – \% mortality next below}}$$

*i.e.* (from the second table) $\frac{50-20}{60-20} = 0{\cdot}75$.

The actual dilution of the endpoint is found from the formula :–

antilog (log lower dilution + proportionate distance × log dilution factor)

*i.e.* antilog (log 16 + 0·75 log 2) = 26·9

*i.e.* a dilution of 1 : 27.

The calculation can be carried out more quickly by a graphical method employing logarithmic paper.

The same method can be employed to determine the biological endpoint of an infective agent by reversing the direction of " deaths " and " survivals " in the tables, but the general principle of calculation remains the same.

—ALFRED EDEN.

ANGELOFF. (1939). Das Veterinärwesen und die Tierseuchenbekämpfung in Bulgarien. **[Veterinary Affairs and Animal Disease Control in Bulgaria].**—*Dtsch. tierärztl. Wschr.* **47.** 717–722.

This is a very detailed account. After giving

statistics which show that Bulgaria is almost entirely a pastoral country, the need for a good veterinary service is stressed. The first Bulgarian veterinarians were trained in France in the last decade of the past century and technical assistants were also employed in veterinary work, being trained at a special school in Sofia up to 1924, when the supply of veterinarians became easier.

A law for the inspection of foodstuffs of animal origin was passed in 1897 and one for the control of animal diseases in 1908; these were brought up-to-date in 1922 and 1924 respectively. The State veterinary service consists of six inspectorates and has the power to enact animal disease regulations. There is a central veterinary bacteriological institute at Sofia, two secondary ones at Tirnovo and Stara Zagora and six other smaller ones in the various provinces. The staffing and work done are described. The country is organized into sections and sub-sections staffed by seven departmental veterinarians and 84 district veterinary officers stationed at animal clinics; there are 20 veterinary officers concerned with TB. control and diseases of reproduction. All clinical animal treatment is done by the State veterinarians, free of cost to the poorest peasants.

All private abattoirs have been abolished to be replaced by 108 town and 291 village abattoirs, where inspections for trichinosis and cysticercosis are obligatory. Milk control is said to be of a high standard and every milch cow is regularly examined and tuberculin tested once a year.

The financing of the veterinary service is done largely by levies on animals and animal products exported. The total annual revenue for the veterinary service is about 35 million leva.

The veterinary faculty at Sofia university was founded in 1923 with ten teaching chairs. Four German professors were engaged for some years to organise the work. The number of students was about 180 in 1939 and 494 have been trained. [Length of curriculum not stated.]

The last half of the paper describes the disease situation with regard to anthrax, TB., glanders, swine erysipelas, haemorrhagic septicaemia, blackleg, dourine, piroplasmosis, foot and mouth disease, rinderpest, swine fever, sheep pox, rabies, pleuro-pneumonia of goats, and infectious diseases of poultry. Rinderpest is not now present, but broke out in 1913.—J. E.

## OFFICIAL AND OTHER REPORTS

GREAT BRITAIN. (1941). **Annual Report for 1940 of the Principal of the Royal Veterinary College.** [BUXTON, J. B.]—*J. R. agric. Soc.* **101.** Pt. II. 121–124.

The following comprise the most important items of investigational and research work carried out by the Royal Veterinary College. Mastitis and contagious abortion; calf diseases and calf mortality; improved methods for the isolation of *Mycobacterium paratuberculosis*, and the length of time which the bacillus is able to survive in water; enzootic pneumonia in sheep; incidence and cause of "milk-spot" liver in pigs; investigation of the life cycle of *Babesia bovis*; relationship between "redworms" and aneurisms in horses; investigation of the alleged toxic effects of feeding cod liver oil to pigs and other livestock; investigations on the physiology of the developing foetus and the physiological and pharmacological properties of the placenta; the application of preventive medicine to diseases affecting livestock.

Some of the items listed have been reported by the individual workers concerned, and abstracts of these will be found elsewhere in the *Vet. Bull.*—N. J. SCORGIE.

INDIA. (1940). **Agriculture and Animal Husbandry in India 1937–38.** pp. iii + 416. 17 appendixes. Delhi: Manager of Publications. [8vo] [Rs. 5–14 or 9s. 3d.]

Only a small part of the report concerns animal disease questions.

GENERAL.—The main items of veterinary interest during the year are reviewed briefly. The incidence and losses from bacterial and virus diseases show little change from the previous year. The value of the work of the veterinary investigation officers is again mentioned.

BACTERIAL DISEASES.—The factors governing the occurrence and transmission of HAEMORRHAGIC SEPTICAEMIA do not appear to have been examined in sufficient detail and it is clear that more information is required on the real value

of the present methods of control. It is considered that PASTEURELLOSIS of sheep is more prevalent than had been suspected. BLACKLEG is widespread. The incidence of ANTHRAX is low; spore vaccine is being tried out in most provinces. Reports show that the incidence of TUBERCULOSIS and JOHNE'S DISEASE is probably widespread and these diseases may be of some economic importance. Reports of Johne's disease in goats and sheep were received. There were fewer cases of GLANDERS and STRANGLES among equines. FOWL CHOLERA was prevalent.

VIRUS DISEASES.—RINDERPEST is still the predominant cause of mortality. Goat virus vaccine, either in the form of blood or spleen pulp, is the most popular means of control. Serum is used along with the vaccine for the more susceptible animals, particularly for buffaloes. The whole of India was affected by FOOT AND MOUTH DISEASE and the mortality was high. Infection occurred among sheep and goats as well as cattle, although the mortality among goats was not high. SHEEP POX and outbreaks of PNEUMONIA of uncertain origin in sheep were prevalent. Poultry diseases have received more attention; FOWL POX and NEWCASTLE DISEASE were prevalent. It is difficult to estimate the extent and importance of RABIES from the reports, which relate to outbreaks in towns or cases in which large domestic animals were involved.

PROTOZOAN DISEASES.—Reference is made to the morphological studies on *Trypanosoma evansi* carried out at Mukteswar. The phenomenon of auto-agglutination in which the parasites exhibit "head to tail" arrangement has been noted in *T. evansi* from both cattle and horses. In an artificially induced relapse case of equine SURRA, atypical forms of *T. evansi*, encountered in peripheral blood, were found to enter the monocytes and to assume a leishmanial form. It is suggested that this observation may be of use in investigations into the mechanism of relapse in surra cases treated with a single dose of naganol. Naganol was successfully used for the treatment of surra in equines; in one state a single intravenous injection of a 10% solution was effective. Tartar emetic was used successfully in the treatment of bovines. *T. theileri* was isolated from a local bull and successfully cultivated *in vitro*. Leishmanial and crithidial stages, as described by other workers, developed in the cultures, but no infection could be produced by inoculation of healthy bulls with the crithidial forms. In studies on theileriasis of cattle it was found that the innocuous *Theileria mutans* divides in the cytoplasm of the erythrocytes, while the dividing forms of *T. annulata* are found as Koch's bodies in the cytoplasm of the monocytes. The predilection site of the latter parasite is lymphoid tissue generally. *T. ovis* in sheep and *T. hirci* in goats were reported from Bombay, the disease in sheep being widespread. BABESIASIS caused 4·5% mortality among 45 infected horses. A study of the nuclear structure of *Babesia bigemina* has not supported the views of DENNIS (1930) as to its evolution, but the observation of NUTTALL & GRAHAM-SMITH (1908) that the nucleus is situated at the apical end was confirmed [see also RAY.—*V. B.* **9**. 533]. A study of the stages of *B. gibsoni* within the vertebrate host showed two forms in the erythrocytes, (a) round or oval and (b) thin and elongated. The former multiply by binary fission while the method in the latter type is highly suggestive of schizogony. *Bartonella canis* was first noted in the erythrocytes of dogs at Mukteswar in 1936–37; studies have since been made with a pure strain of the parasite which causes a fatal and progressive anaemia in healthy dogs. The illness lasts 16 days in the acute form and 3–4 weeks in the subacute form. The organisms occur as minute coccoid or bacillary forms, sometimes in chains.

The chief predisposing factors in COCCIDIOSIS of cattle (*Eimeria smithi* infection) are lack of proper food, lack of vitamin A, and bad hygienic conditions. *E. arloingi* infection in sheep, goats, and rabbits does not appear to be pathogenic.

HELMINTHOLOGY.—Outbreaks of FASCIOLIASIS were dealt with in several provinces; carbon tetrachloride gave good results in treating goats and sheep. VERMINOUS PNEUMONIA in goats was found to be due to either *Varestrongylus pneumonicus* or *Dictyocaulus filaria*. Both the nasal and portal types of SCHISTOSOMIASIS were observed. HUMP SORE occurs throughout Bengal, except in the hilly tract. In Assam old lesions of this disease can be divided into (a) active summer lesions, and (b) quiescent winter lesions. PARASITIC GASTRITIS was found to be due to *Mecistocirrus digitatus* in the Central Provinces and to *Haemonchus contortus* in Sind. Other conditions noted were ASCARIASIS in calves, and AMPHISTOMIASIS in goats and sheep. Microfilariae were found in dogs, horses, cattle, and poultry, and two species were recorded

parasitizing a tick found on cattle. Attempts made at Mukteswar to transmit microfilariae to cattle through blood-sucking insects were unsuccessful. CUTANEOUS MICROFILARIASIS in Orissa and Hyderabad (Deccan) was successfully treated with tarter emetic. A published report of the Punjab helminthological research scheme contained conclusions reached after three years' experiments, *viz*, a mixture of copper sulphate and kamala was the best anthelmintic for *Haemonchus* infestation, copper sulphate with sodium arsenite being the next best; animals fed on a balanced ration resisted helminth infestation better than those fed on grasses growing in the area under investigation.

ENTOMOLOGY.—The life-history and bionomics of *Hypoderma lineatum* were studied. In certain parts of the North-West Frontier Province, *H. crossi* was the cause of warble tumours in cattle. Severe outbreaks of MANGE in goats, with heavy mortality, were reported from several provinces. An investigation into the aetiology of "TICK TOXAEMIA" in certain heavy rainfall areas suggested that the toxin may possibly be present in the saliva of the tick.

NUTRITION.—The fodder and concentrates fed to cattle in areas where OSTEOMALACIA is prevalent were found to be deficient in P; the serum and bones of the affected animals also had a low P content. NIGHT BLINDNESS and certain eye diseases are thought to be due to vitamin A deficiency in the diet of cattle fed exclusively on a dry ration and kept indoors for 8–12 months. Similar conditions in elephants are, it is suggested, due to the same causes. Experiments are being carried out at Mukteswar, to ascertain whether there is any loss of vitamin A in fodder plants during the drying and conserving processes practised by farmers. GOITRE in horses occurred at Saugor. The iodine content of the blood was low; the results of histological examination of the enlarged thyroid glands are described. Observations made in Bombay and Bengal as well as in other provinces of India indicate that mineral deficiency and lack of vitamins in the fodder are causes of STERILITY and ABORTION in dairy cattle. In 87 cases of EQUINE ABORTION, analyses of the sera showed that 51·7% were low in P and that there was a gross imbalance of P and Ca in all the others. Investigation of KUMRI in Assam showed a stage in the development of osteofibrosis (osteodystrophia fibrosa) caused by the imbalance of P and Ca in the diet. Dietary deficiencies are also factors which increase the rate of mortality in JOHNE'S DISEASE and such factors operate in the various HELMINTH INFESTATIONS.

TOXICOLOGY.—Chemical investigation of an outbreak of *jowar* poisoning showed the presence of hydrocyanic acid in every sample of foodstuffs examined. The twigs and leaves of *Andrachne cordifolia* will kill cattle when grazed in the early morning. The seeds, flowers, and leaves of *Lantana camera* are known to be poisonous to cattle and to cause mortality.

LIVESTOCK IMPROVEMENT.—A review is given of the experiments and other work carried out on animal nutrition and on breeding operations and dairying.

VETERINARY EDUCATION.—Further action on a proposal to establish a central veterinary college was under the consideration of the Government of India. The diploma course of the Madras veterinary college has been extended to four years as from 1938–39 and the B.V.Sc. course is also being revised. There was no change in the length of the courses in the Bombay, Bengal, Punjab, and Bihar veterinary colleges. The annual post-graduate refresher course was held at the Imperial Veterinary Research Institute, Mukteswar, in addition to special courses and short courses of practical training.—J. A. GRIFFITHS.

I. CANADA, PROVINCE OF NEW BRUNSWICK. (1938). **Report of the Provincial Veterinarian, 1937-38.** [AKINS, J. T.]—*Rep. Dep. Agric. N. Brunswick, 1937–38.* pp. 31–34.

II. CANADA, PROVINCE OF NEW BRUNSWICK. (1938). **Report of the Superintendent of the Poultry Division, 1937-38.** [WOOD, F. L.]—*Ibid.* pp. 36–41.

I. The demand for veterinary services necessitated an increase of staff. The Department controls only those infectious diseases which are not dealt with by the Federal Health of Animals Branch. HAEMORRHAGIC SEPTICAEMIA was the most important cause of losses among cattle and pigs. Large doses of haemorrhagic septicaemia serum and bacterin used in one outbreak among cattle in the Aulac district did not prevent deaths in the herd. A bacterin prepared from the organism recovered from this outbreak was used successfully in the following winter for suppressing the intestinal

form of the disease in cattle. An outbreak of the disease among young pigs was also controlled by the use of the same bacterin. An outbreak of haemorrhagic septicaemia (pneumonia) occurred in market hogs; unweaned piglets on the premises developed diarrhoea but not pneumonia. Inoculation is said to have quickly prevented further cases of the lung infection. Over 1,000 pigs were inoculated. An outbreak of yellowish diarrhoea in piglets three days to three weeks old on another premises was considered to be due to haemorrhagic septicaemia, but the grounds for this statement are not given. Outbreaks of acute PHARYNGITIS in cattle were also controlled by the use of haemorrhagic septicaemia and *Bacterium coli* bacterin. This was found to be useful in treating cases in the initial stages of the condition. In the eradication of CONTAGIOUS ABORTION, 5·27% of reactors were found among 1,591 cattle in the first tests. Altogether 4,531 tests were made.

FOOD POISONING of foxes and mink was met with on ranches throughout the province. On one ranch botulinum intoxication was treated by the use of antitoxin. A large number of the infected animals recovered. Bread in the ration, contaminated with *Clostridium welchii*, was a cause of losses in several outbreaks. The animals had convulsions and P.M. examination revealed enormous distension of the stomach and intestines. Two outbreaks of disease among mink which resembled botulinum intoxication, in which the losses were 14%, were found to be due to vitamin A and D deficiency.

Equine HELMINTH INFESTATION is being controlled by the treatment of horses at centres where they can be collected in each district; carbon disulphide is used for this treatment, which is voluntary.

II. With few exceptions, poultry health has been good. 43,694 birds were tested for PULLORUM DISEASE and 1·85% of these were found to be infected. The flocks of 218 breeders were tested and of these 164 were free from reactors. The infection is centred in a few flocks and every effort is being made to eliminate the disease by repeated testing for reactors. Most of the eggs now supplied to hatcheries are from the pullorum-free flocks and the greatly reduced chick mortality has been most noticeable.—J. A. G.

AUSTRALIA. (1939). **Thirteenth Annual Report of the Council for Scientific and Industrial Research, for Year 1938-39.** Animal Health and Nutrition Investigations pp. 16–18 and 26–42. Canberra: L. F. Johnston. [fcp] [4s. 6d.]

Systematic search in ENTEROTOXAEMIA material and soils failed to reveal the presence of any Types of *Clostridium welchii* other than A and D. Encouraging results have been obtained in the prevention of BOVINE HAEMATURIA by top-dressing the pasture with gypsum. Investigations on BOVINE MASTITIS were continued for the fourth year on the herd which had been founded from healthy non-lactating heifers, and maintained under quarantine conditions. Mastitis streptococci appeared in the herd despite this care. Each year the number of infected quarters and the number of cases of mastitis had risen. The type of streptococcal mastitis encountered differed from that usually described outside Australia, in that it was more acute in onset but more temporary and less damaging. The invasion of the udder by streptococci did not always produce clinical mastitis, and it was concluded that some other factor must operate.

Earlier experiments had indicated that the condition known as "PEG-LEG" was due to aphosphorosis. In a more recent trial, however, the administration of phosphorus proved of little benefit, so that another factor is thought to be involved also.

An extensive programme of SHEEP BREEDING is being undertaken, including genetics and study of factors influencing fertility. Field trials indicated that sheep on pastures supposedly deficient in phosphorus receive no benefit from phosphatic supplements. In those areas where copper deficiency (ENZOOTIC ATAXIA) occurs in sheep, the pastures are greatly benefited by a top dressing of copper sulphate. A complete study is being made of *Melophagus ovinus* and some details of the life-cycle are reported here. Polworth-ewes are less susceptible to breech STRIKE than plain-breeched Merino ewes. The beneficial effects of Mules' operation were permanent over a period of observation of four years. "Fleece rot" is correlated with age, being much more prevalent in lambs. Quite apart from this, lambs are more attractive to blowflies than aged sheep. In a study of repellents, oil of citronella and oil of sandalwood appeared promising. Physiological studies of the maggot showed that

iron and copper are absorbed only by a narrow section of the midgut where the reaction is acid. Sheep resistant against *Haemonchus* overcome the parasite at some time within six days of the larvae being ingested. Drugs have been tested by injection directly into the abomasum for anthelmintic effects against TRICHOSTRONGYLOSIS. Carbon bisulphide in tylose emulsion and tetrachlorethylene in tylose emulsion gave encouraging results. Tobacco preparations in lick form had no effect in preventing trichostrongylosis. Epidemiological studies on OESOPHAGOSTOMIASIS suggested that treatment during the winter, together with rotational grazing, may control the disease. Field trials on the eradication of FOOT-ROT in sheep, following the discovery of the specific causal organism, have been successful.

Experimental work on the use of MYXOMATOSIS for controlling the rabbit pest was continued. In one colony experiment, myxomatosis died out owing to a simultaneous outbreak of pasteurellosis, which resulted in the animals dying before myxomatosis could be transmitted. In two field experiments in a 90-acre enclosure, epidemics were started but died out without nearly exterminating the rabbits. This is apparently because the rabbits wander away from their colonies as soon as they become ill and before they are infective.

—W. I. B. BEVERIDGE.

UNION OF SOUTH AFRICA, CITY OF JOHANNESBURG. (1941). **Report of Director of Abattoir and Live Stock Market Department for the Period 1st July, 1939, to 30th June, 1940.** [KIRKPATRICK, A. C.] pp. 25. Johannesburg: Radford, Adlington, Ltd. [fcp].

During the year 6,182 quarters of chilled beef were exported. Of the total number of cattle slaughtered for export 100 quarters were rejected for cysticercosis, 11·08% were rejected for condition and 1·69% for bruising; these figures show marked improvement over previous years. The report discusses local problems regarding the marketing of cattle and the question of provision of subsidies on export beef, a policy which is necessary in South Africa owing to the high production costs compared with those of other countries.

The health of mules, horses, and oxen in the service of the municipality was satisfactory during the year. There were no deaths from HORSE SICKNESS which had caused severe losses in the previous year. Details of causes of illness and death in zoo animals are recorded. There was no outbreak of contagious disease. Among the mammals PNEUMONIA was the commonest disease and the most frequently fatal.

In the cattle-fattening scheme at Delta Farm useful data had been obtained relating to fattening of stores under typical South African conditions. There was no outbreak of infectious disease, and tick-borne diseases were under effective control by fortnightly dipping.

Increased vigilance in inspection of dairy cows had resulted in the detection of a larger number of tuberculous animals than in previous years. 497 dairies were visited and 24,926 cows inspected. Thirty-three cases of TUBERCULOSIS were confirmed, and the disease was suspected on clinical grounds in a further 60 cases. Clinical examination revealed that about 5% of milch cows showed signs of past or present disease of the udder, but it is stressed that laboratory examination would have detected far more cases. Laboratory examination of bulk samples of milk at depots and railway stations is being developed in order to check the efficiency of herd inspections for tuberculous mastitis. Of 38 samples thus examined from 34 depots, only one was positive for TB. and four for brucella infection.—H. E. HARBOUR.

MAURITIUS. (1941). **[Report of] Veterinary Division 1939.** [LEFEBURE, Y.].—*Rep. Dep. Agric. Mauritius, 1939.* pp. 27–29.

Eight positive cases of TRYPANOSOMIASIS were recorded, seven due to *T. evansi* in five bovines and two horses and one to *T. vivax* in a bullock. 348 animals were tuberculin tested and 40 positive reactions were noted. 186 doses of BCG vaccine were issued but difficulties with the growth of the strain hampered the work.

Two cases of PIROPLASMOSIS occurred in bovines. Abortions in the government dairy herd numbered 24. A *Streptococcus* was said to be associated and a vaccine was being tried.

Animal husbandry notes are concerned chiefly with the progress of the bulls of the Afrikander and Charolais breeds which were imported in 1938 with a view to improvement of local breeds and establishment of a local beef breed.—H. E. HARBOUR.

NIGERIA. (1940). **Annual Report of the Veterinary Department for the Year 1939.** [HENDERSON, W. W.] pp. 11. Lagos: Govt. Printer. [8vo] [1s.]

The control of contagious diseases of cattle continues to be the department's main task. BLACKLEG was recorded in Adamawa, Bauchi, Katsina, and Kano Provinces. The only serious outbreak was in Adamawa Province where vaccination of the in-contacts and quarantine measures brought the outbreak under control. A total of 554,449 cattle were given formalinized culture vaccine. There were very few outbreaks of ANTHRAX during the year. Thirty cattle were infected in an outbreak in Bornu Province and three cases were reported in Sokoto Province. The disease was also recorded in donkeys in Sokoto Province and in pigs and sheep in Bornu Province. 23,061 cattle were vaccinated against anthrax. HAEMORRHAGIC SEPTICAEMIA was more prevalent than in former years, particularly in Adamawa Province, but also in Zaria and Plateau Provinces. Vaccinations are said to have checked effectively the spread of the disease in the Plateau Province; a total of 57,655 cattle was vaccinated. Only nine cases of bovine TUBERCULOSIS were reported in the Northern Province. The double intradermal test was found to be very reliable and is probably the most practicable under African conditions. More cases are being recorded of TRYPANOSOMIASIS, probably as a result of the confidence of the Fulani cattle owners in the results obtained in treating cattle for this disease during the past ten years. This disease is the most serious of those dealt with among cattle. It is more difficult to control, as a series of intravenous injections are necessary in carrying out drug treatment and reinfection readily takes place as tsetse flies are widespread in many of the grazing areas used. Any tolerance acquired may break down under the strain of any one of many extraneous factors. Trypanosomiasis is always a serious problem among animals used for RINDERPEST antiserum production and this has proved particularly the case at the new serum laboratory in Adamawa Province, where tsetse fly and trypanosomiasis are very prevalent. The disease is undoubtedly a great stumbling-block in the policy being developed by Government for making use of cattle for manure production in schemes of so-called "mixed farming" in tsetse-fly infested areas, where cattle cannot normally exist or where at best only the trypanosome-resistant dwarf breeds of cattle are kept. RINDERPEST immunization was carried out at 45 centres and 353,326 cattle were immunized by the serum-virus method and 356,860 by the use of spleen vaccine. There was an increase from 15 in 1938 to 151 in the number of outbreaks of rinderpest reported in Kano Province. Mortality everywhere is, however, low owing to the large proportion of immune animals. BOVINE CONTAGIOUS PLEURO-PNEUMONIA was reported in 24 centres in Kano Province and in one only in Adamawa Province. A total of 326,141 cattle were given the attenuated culture vaccine, mainly in the course of operations at rinderpest immunization centres. RABIES was reported from every province in Northern Nigeria. The disease causes grave concern. FOOT AND MOUTH DISEASE was generally less prevalent except in the northern frontier district of Katsina Province. A total of 27,062 cattle received treatment and 82,205 calves, sheep, and goats, for HELMINTH infestation.

A veterinary research officer was to be appointed, as the result of financial provision from the Colonial Development Fund, for investigations into CAPRINE CONTAGIOUS PLEURO-PNEUMONIA. The most important diseases of horses and donkeys are TRYPANOSOMIASIS and EPIZOOTIC LYMPHANGITIS. There is a form of the latter disease known locally as "Naraguta disease" in which there is progressive paresis and paralysis. Advanced changes are always present in the kidneys and, less frequently, in the lungs and liver. There were no cutaneous lesions in the cases recently investigated, but the internal organs contained "organisms indistinguishable from the causal pathogens of the diseases epizootic and ulcerative lymphangitis". TETANUS was prevalent among police horses in Sokoto.

SPIROCHAETOSIS in fowls, transmitted by *Argas persicus*, was reported from Bauchi, Kano, and Katsina Provinces.

The animal clinics have been extended and have increased in popularity; 25,937 cases were treated.

The Kano school for the elementary veterinary training of subordinate African staff passed out 42 pupils during the year. A scheme for the higher training of educated Africans as veterinary assistants is under consideration.

Under the heading of Animal Husbandry reference is made to the necessity in the more densely populated parts of the country of encouraging the provision of dry season fodder for livestock. The scheme for increasing the numbers of the red goat in the areas in which it thrives has been continued. 69,688 non-

red billy goats were castrated. An effort is being made to introduce pure Rhode Island Red poultry in Bauchi Emirate and this is meeting with some success. There is a steady increase in the consumption of meat in Nigeria. Approximately 400,000 head of cattle are slaughtered annually for food. Prices vary from 10/– up to £10. The value of hides and skins exported amounted to £456,197, an increase on the figures for 1938. Clarified butter manufacture is increasing, and exports amounted to 1,967 tons. This represents the purchase of 2,400 tons of butter from the Fulani cattle owners who received £55,000. The production of butter from milk at centres established at Vom and Kano has proved so successful that it is to be extended. The operations of the stock farm at Vom are described.—J. A. GRIFFITHS.

UGANDA PROTECTORATE. (1941). **Annual Report of the Veterinary Department for the Year ended 31st December, 1940.** [SIMMONS, R.] pp. 7. Entebbe: Govt. Printer. [8vo] [Shs. 1/50.]

In spite of war conditions there was some improvement in meat supplies and livestock trade. The development of a new export trade in livestock to supply Kenya canneries was a good feature which would help in the solution of the problems of overstocking and soil erosion in the Eastern Province.

In the eastern area some 90,000 head of cattle were immunized against RINDERPEST at the end of 1939 and beginning of 1940, and a broad immune belt thus formed proved effective in preventing further spread from the threatening outbreaks of 1939. Along the Kenya border, where outbreaks occurred from time to time, the immunization of 33,618 head prevented further spread of the disease, and at the end of the year only one small focus remained.

There was little to report regarding the control of sporadic outbreaks of other diseases (ANTHRAX, TRYPANOSOMIASIS, etc.) which were dealt with in the usual manner.

Attempts made to produce a neurotropic strain of RINDERPEST virus in g. pigs, rabbits, and goats were unsuccessful. Experiments to determine the size of the rinderpest virus particles indicated a size of 84–126$\mu$. These experiments were hampered by the difficulty of obtaining free virus. Its adsorption on the white cells causes a loss in filtration so that a virulent spleen of minimal infective dose 0·001–0·0005 g. is found after filtration through a Berkefeld V filter to be non-infective in doses less than 0·1 g.

Drugs of the diamidine series were effective against *T. congolense*, *T. vivax*, and *T. brucei* in cattle, but there was a delayed toxic action which often led to death after one or two months. M & B 782 (4 : 4-diamidino-diphenoxy-propane) proved effective in BABESIA INFECTION of puppies in two successive daily doses of 2·5 mg. per kg. body weight; there was no toxic effect and relapses were few. An outbreak of disease in sheep was tentatively diagnosed as an atypical form of NAIROBI SHEEP DISEASE in which tumor splenis was absent. The disease was transmissible to sheep and goats by inoculation of blood passed through a Berkefeld N filter. No detailed description is given.

Mönnig's copper-sulphate and tetrachlorethylene treatment for stomach worms in sheep was found ineffective in native sheep which were highly susceptible to the toxic effects of tetrachlorethylene.

Extension of tsetse fly has necessitated further work on barrier clearings etc.

The report concludes with notes on animal husbandry, cattle markets, and legislation.

—H. E. HARBOUR.

ZANZIBAR PROTECTORATE. (1941). **Annual Report on the Department of Agriculture for the year ended 31st December, 1940.** Items of veterinary interest p. 8.

Imports of slaughter stock were 1,254 oxen and 5,931 sheep and goats. 178 bulls were castrated. 6,778 fowls were given FOWL TYPHOID vaccine. A cattle dip has been constructed and six heifers and two bulls of the Boran breed from Kenya have been imported to improve local cattle. Twelve deaths from ANTHRAX occurred and 1,225 in-contacts were inoculated with anthrax vaccine.—J. A. G.

BURMA. (1940). **Report on the Civil Veterinary Department, Burma, For the Year Ending 31st March 1940.** [S. R. RIPPON]. pp. 30. Rangoon: Supt. Govt. Printing & Stationery. [8vo] [Rs. 1–4 = 1s. 11d.]

Captain RIPPON succeeded Mr MITCHELL as director on March 16th, 1940. The general organization of the department, except for the new post of Deputy Director of the central charge and of cattle breeding remained unchanged.

The authorized staff consists of Burma veterinary service, class I – 6 posts; class II – 9 posts (one vacant); class III – 55 veterinary inspectors (seven vacancies) and 194 veterinary assistants (37 vacancies).

The number of cases treated by itinerant officers was 33,554. At Insein veterinary hospital 2,207 animals were treated and at Tatkon veterinary dispensary 446 cases. Mortality from all causes was 118,088 cattle, that from contagious diseases being 9,185 cattle and 17 elephants. Deaths from HAEMORRHAGIC SEPTICAEMIA were higher than in the previous year, being 4,293 as against 3,613. There were 373 deaths from BLACKLEG and 150 from SURRA, *viz*, 133 ponies and 17 cattle. No cases of GLANDERS were reported. Very few districts escaped FOOT AND MOUTH DISEASE; mortality was heaviest in Lower Burma (during severe floods). RINDERPEST mortality at 1,673 was lower than in the previous year, the majority of the deaths occurring in Shwebo, Pegu, and Toungoo. Preventive inoculations carried out included RINDERPEST 478,625 cattle and buffaloes, HAEMORRHAGIC SEPTICAEMIA 51,683 animals, and ANTHRAX 12,488 bovines, 561 equines, and 3,854 elephants. Combined HAEMORRHAGIC SEPTICAEMIA and ANTHRAX vaccines were given to 63,777 bovines.

At Insein Veterinary college 17 taking the 12-months' course passed. Nine graduates of Indian colleges received post-graduate training. Five students were under training in Indian colleges. Two Burmese students continued training for the M.R.C.V.S. diploma in the British Isles.

At the Veterinary Research Laboratory the specimens examined included 1,367 blood smears; details are given of the findings. Vaccines issued included 645,200 doses of RINDERPEST desiccated goat-spleen vaccine, 119,388 doses HAEMORRHAGIC SEPTICAEMIA, and 83,670 doses ANTHRAX spore vaccine for bovines, 5,742 for equines, and 7,183 doses for elephants. RINDERPEST goat virus was maintained by passage at least every week through goats and storage at 42°F. in the form of dried spleen powder. The 410th passage of this strain was completed 30/3/40. The virus was still virulent for goats. Duration of immunity experiments show that cattle inoculated with the dried virus are still resistant to rinderpest virulent blood at the end of five years even though they have not been exposed to natural infection. The dose of dried spleen powder used for cattle may be given to buffaloes. During the past four years of a total of 3,785,000 cattle (excluding calves and buffaloes), 1,764,900 (over 45%) received rinderpest desiccated goat-spleen vaccine. ANTHRAX spore vaccine continues to give satisfactory results, but isolated severe reactions occur. Two elephants died as a result of anthrax inoculation; both had a microfilarial infection. Ninety-three elephants were found to have microfilariae in the blood; with very few exceptions these elephants died suddenly or were subject to chronic skin abscesses or swellings of the limbs. Two adult specimens, tentatively identified as *Dirofilaria repens* were recovered from " the tissues around the heart " in one case. SURRA in elephants has been effectively treated with 1 oz. of naganol repeated after eight days, but the cost is prohibitive. A course of 20 daily doses of 30 grains of arsenious acid, with further doses if necessary after ten days was found to be fairly effective. For the prevention of WARBLES in elephants a spray of 1 part of neem oil in 9 parts of paraffin is said to have given encouraging results. Washing with " Soo Yit " is said to be both preventive and curative.

—J. A. GRIFFITHS.

TUNIS. (1939). Fonctionnement des Services de l'Institut Pasteur de Tunis pendant l'année 1938. **[Report of the Pasteur Institute of Tunis, for 1938].** [BURNETT, E.]—*Arch. Inst. Pasteur Tunis.* **28.** 272–291.

Out of 1,656 human cases of proved or suspected RABIES, 1,079 were regarded as infected and were treated. Dogs were the transmitting agent in all but 83 cases. The usual list of veterinary diagnostic examinations made is given in tabular form, also a list of biological products issued.—L. TOBBACK.

## BOOK REVIEWS

MYERS, J. A. [Ph.D., M.D., F.C.A.P., Professor of Medicine and Preventive Medicine and Public Health, University of Minnesota and Chief of Medical Staff, Lymanhurst Health Center, Minneapolis]. (1940). **Man's Greatest Victory over Tuberculosis.** pp. ix + 419. 30 figs. Springfield, Ill.: Charles C. Thomas, &

London: Baillière, Tindall & Cox. [8vo] [$ 5.00].

In this book an account is given of the great success achieved by veterinarians in dealing with tuberculosis, which has been practically eradicated from cattle in the U.S.A. after a campaign of about 23 years, whilst the disease is still prevalent and uncontrolled in the human population.

The book gives a very detailed history of the eradication of bovine tuberculosis and of the advance of medical knowledge leading up to the plane of knowledge on which the eradication scheme was based, including accounts of Koch's discoveries and the controversy over the nature of the specific types of tubercle bacilli and the susceptibility of man to the bovine type bacillus. A wealth of detail is given about the persons concerned, including their life-histories and utterances. The book is therefore very full historically and biographically and it is this that gives it its rather large size and that supplies plenty of human interest, without which the mere facts of the great work done would make very tedious reading.

The progress in eradication has, of course, been described in numerous official reports, but it seems apposite here to note that the eradication plan was put into operation in 1917 and that by August 1940 the whole of the U.S.A. with the exception of two counties in California was on a "modified accredited" basis, which signifies that the incidence of tuberculosis, as indicated by the tuberculin test, was less than 0·5%.

Not the least part of the early work was the needful education of the public about the desirability of eradicating bovine tuberculosis and for the purpose of obtaining co-operation. This was a huge task, accomplished in the face of great opposition which ran as far as to include physical violence, as in the "Iowa war" of 1931. The experience gained on this aspect is most valuable and would be of the greatest value to a government department embarking on a great disease eradication campaign.

In addition to the main theme, a great deal of information is given on other aspects of tuberculosis in animals and man. For the purposes of rapid consultation the gist of each chapter is summarized at the end and there is a select bibliography and index.

This is a great story finely told and one that all interested in animal health should read. The book is excellently bound and printed for tireless reading and should be widely appreciated.

—J. E.

BIERER, B. W. (1940). **American Veterinary History. Parts I-VII.** Pt. I. pp. 1–28, Pt. II. pp. 29–54, Pt. III. pp. 55–79, Pt. IV. pp. 80–102, Pt. V. pp. 104–147, Pt. VI. pp. 148–192 and Pt. VII. pp. 193–222. Baltimore, Md.: The Author [4to] [Mimeographed].

The author declares that he has "endeavoured to record in a compact form the more important and interesting phases of the history of veterinary medicine in North America". What he has done is with great industry to gather together materials for a history of veterinary science in America. He has copied out in full many of his sources, the references to which (about 700 in all) occupy 19 pages.

The arrangement of the book is not well planned, and there is much overlapping and repetition. When giving an account of the growth of veterinary medicine in Europe the author does not quote any of the European authorities on veterinary history, but depends on scattered articles which he has found during a very wide reading of American veterinary and agricultural literature.

Towards the end of the 18th century the works of GIBSON and TAPLIN were known in America, and there is an interesting note that, in 1759, George Washington ordered from England a copy of "Gibson upon Horses, the latest edition". This would be the second edition, 1754. Praise is given to the good influence of WILLIAM YOUATT'S writings which led to a better appreciation of veterinary science in America. The works of TAPLIN and BRACKEN were reprinted in America, but by the beginning of the 19th century there appeared a few works composed in America and adapted to American conditions.

The first qualified veterinarians to practise in America came from Great Britain, among them being JOHN HASLAM (qualified London 1799), J. CARVER (1815), C. C. GRICE (1826), and others. They practised mainly in New York, Maryland, Pennsylvania, Massachusetts, South Carolina, California, and Canada. J. CARVER wrote in 1818 a "Description of the London Veterinary College" in the endeavour to encourage the establishment of a similar college in America, but he did not succeed. The rise of a number of agricultural societies,

however, helped to form public opinion as to the necessity for the provision of instruction for veterinarians.

In 1855 there was established in Michigan a state agricultural college in which instruction in the veterinary art was given. Others followed in many states. The first veterinary school was founded at Toronto by the efforts of the Board of Agriculture for Ontario. The Board sent a request to Professor DICK "to recommend a gentleman thoroughly qualified both to practise and to teach the veterinary art", and he selected ANDREW SMITH of Ayrshire, a graduate of Dick's College. Smith started his course of lectures in 1861. Later came the Montreal Veterinary College established in 1866 by DUNCAN MACEACHRAN, also of Dick's College. These two schools furnished a large number of successful practitioners.

In the United States, veterinary schools were started between 1850 and 1860 in Philadelphia, Boston, and New York City, but they were short-lived. A complete list of the 30 schools established up to 1900 is given; of these, 13 had disappeared before 1900. During the next 30 years 13 more schools were opened, and 20 disappeared. By 1927 no private schools remained. The section of the work describing the rise and fall of these schools helps to unravel the complicated story of the competing diploma-granting bodies of which for many years there was a plethora.

There are now nine state veterinary schools, and one veterinary college in a state-aided university in the United States, and two provincial veterinary colleges in Canada. The complete list is as follows :– Ontario Veterinary College; Ecole de Médecine Vétérinaire de la Province de Québec; Iowa State College, Division of Veterinary Medicine; University of Pennsylvania, School of Veterinary Medicine; Ohio State University, College of Veterinary Medicine; New York State Veterinary College at Cornell University; State College of Washington, College of Veterinary Medicine; Kansas State College, Division of Veterinary Medicine; Colorado State College, Division of Veterinary Medicine; Alabama Polytechnic Institute, School of Veterinary Medecine; Michigan State College, Division of Veterinary Science; Texas State College, School of Veterinary Medicine.

A description of the foundation and a brief history is given of all these schools. There is at present in America no means of controlling the standard of the veterinary qualification. The problem of the co-ordination of veterinary examinations and of reciprocity among examining boards has been discussed, but has not yet been satisfactorily settled. There is no single recognized standard of qualification as there is in Great Britain and Ireland. The degree granted by the state veterinary colleges is that of D.V.M. Pennsylvania grants the V.M.D.; Quebec the D.M.V., and Ontario the B.V.Sc., M.V.Sc., and D.V.Sc.

In addition to the schools mentioned above, there are about 55 other institutions, mainly agricultural colleges, which give some instruction in veterinary science.

The history of the development of the organization of state veterinary services, culminating in the establishment of the Bureau of Animal Industry in 1884 is given in detail. The Bureau, which employs a personnel of over 4,000, has the following divisions: Animal Husbandry; Animal Nutrition; Biochemistry; Tick Eradication; Virus-Serum Control; Field Inspection; Meat Inspection; Packers and Stockyards; Pathological; Tuberculosis Eradication; Zoological, and Animal Diseases Station.

The author gives a short compendium of American veterinary literature. The first veterinary periodicals were the *American Veterinary Review* (1877) and the *Archives of Comparative Medicine and Surgery* (1880). The former was taken over by the American Veterinary Medical Association in 1915 and became the *Journal of the A.V.M.A.* The *Archives* came to an end in 1903. American veterinary literature is said by the author to have been greatly enriched by the works of GEORGE FLEMING (CHEAUVEAU's "Comparative Anatomy", NEUMANN's "Parasites", MOLLER's "Veterinary Obstetrics", and his "History of Animal Plagues"). The works of WILLIAM WILLIAMS on veterinary medicine and veterinary surgery were also popular.

The work contains biographies of most of America's leading veterinarians and other scientists interested in veterinary medicine. Notes are given on the early use of ether in veterinary practice, and the growth of the use of biological products is described at length. Other sections deal with what are called the great hog cholera problem, the southern cattle fever problem, foot and mouth disease outbreaks, bovine tuberculosis, dourine and sheep scab.—FRED BULLOCK.

3075—Wt.P516—Dd.176—750—11/41—H. R. G. Ltd.—G.13

Printed under the authority of His Majesty's Stationery Office by H. R. GRUBB, LTD., Croydon

# INDEX VETERINARIUS

The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

The latest list of the publications indexed for this purpose was included in *Index Veterinarius*, Vol. 6, No. 1 (issued December, 1933) and also circulated with the *Veterinary Bulletin*, Vol. 9, No. 1.

About 10,000 references are indexed each year, each reference being suitably cross-indexed alphabetically under subjects and under names of authors.

As each half-yearly issue consists of a single complete alphabetical index of subjects and authors' names, a search through it involves a minimum of trouble, and all information required is readily found.

Each number contains the indexing done by the Bureau during the previous half-year, *i.e.*, No. 1, issued in December, covers the indexing done during the previous January to June.

The dates of issue of the two numbers of each volume are as follows :—

No. 1.—Issued December. Indexing period previous January—June.
No. 2.—Issued June. Indexing period previous July—December.

Vols. 1 to 3 (1933, 1934 and 1935) of the Index were produced on a duplicator; from Vol. 4 onwards it has been printed.

Vols. 1 to 5 were issued in quarterly parts; the issue is now half-yearly.

**Annual Subscription, £5.**

A limited number of copies printed on one side only are available for those who wish to mount references on cards.

Orders may be sent to :—

CENTRAL SALES BRANCH,
(IMPERIAL AGRICULTURAL BUREAUX),
AGRICULTURAL RESEARCH BUILDINGS,
PENGLAIS,
ABERYSTWYTH,
N. WALES.

# Imperial Bureau of Dairy Science

## Shinfield, Reading, England

### DAIRY SCIENCE ABSTRACTS

A comprehensive collection of abstracts of current literature dealing with milk and dairy products: husbandry, technology, control and standards, economics, physiology, bacteriology and mycology, chemistry and physics. Published quarterly. Subscription 25s. per volume of 4 numbers (5s. discount to British subjects who subscribe direct): single copies, 7s. 6d.

### Technical Communications

No. 1. The phosphatase test for control of efficiency of pasteurisation. H. D. Kay, R. Aschaffenburg and F. K. Neave. Price 2s. (postage 2d. extra).

---

# Imperial Bureau of Animal Nutrition

## Rowett Institute, Aberdeen, Scotland

### NUTRITION ABSTRACTS AND REVIEWS

Consists of abstracts of papers published throughout the world dealing with the subject of nutrition in all its aspects. They are arranged under the following sections: technique (including chemical and experimental methods), composition of food, physiology of nutrition, human diet in relation to health and disease (including dietary studies, food economics, deficiency diseases and therapeutic dietetics), feeding of animals and book reviews. Each issue also contains a review article on some subject of general interest.

Published quarterly. Annual subscription 42s.

### Technical Communications

These are published at irregular intervals; lists and prices on application.

---

# Imperial Bureau of Animal Breeding and Genetics

## King's Buildings, University of Edinburgh

### ANIMAL BREEDING ABSTRACTS

This journal contains abstracts and reviews of current publications bearing on animal breeding, genetics, production, sex physiology, reproduction and cognate subjects. Published quarterly. Subscription rate, 25s. per annum.

*Occasional Communications* and *Bibliographies* are also issued from time to time.

---

# Imperial Bureau of Pastures and Forage Crops

## Agricultural Buildings, Alexandra Road, Aberystwyth

This Bureau covers current literature on grassland, forage crops and plant biological research, and issues two quarterly publications:—

### HERBAGE ABSTRACTS and HERBAGE REVIEWS

The latter publication contains original articles and reviews on topics which merit more detailed consideration than can be given in the former.

Subscription rates: *HERBAGE ABSTRACTS.* 25s. per annum (single parts, 7s.).
*HERBAGE REVIEWS.* 15s.* per annum (single parts, 4s.).

*A reduction of 5s. will be made when *HERBAGE ABSTRACTS* is also ordered.

At irregular intervals larger monographs are published on miscellaneous subjects in the form of *Bulletins*.

---

**All correspondence regarding subscriptions to journals and sales of occasional publications should henceforth be addressed to: Central Sales Branch (Imperial Agricultural Bureaux), Agricultural Research Building, Penglais, Aberystwyth.**

Printed in Great Britain by H. R. Grubb, Ltd., Croydon.